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CONCERNING A FILING UNDER 35 U.S.C. 371**

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INTERNATIONAL APPLICATION NO.  
PCT/DE/00/00863

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March 20, 2000

PRIORITY DATE CLAIMED  
April 1, 1999

TITLE OF INVENTION  
DEVICE AND METHOD ESPECIALLY FOR THE MOBILE DATA COLLECTION

APPLICANT(S) FOR DO/EO/US  
Knut ADAMS et al.

Applicant herewith submits to the United States Designated/Elected Office (DO/EO/US) the following items and other information:

1. [X] This is a FIRST submission of items concerning a filing under 35 U.S.C. 371.
2. [X] This is an express request to immediately begin national examination procedures (35 U.S.C. 371(f)).
3. [X] The US has been elected by the expiration of 19 months from the priority date (PCT Article 31).
4. [X] A copy of the International Application as filed (35 U.S.C. 371(c)(2))
  - a. [X] is transmitted herewith (required only if not transmitted by the International Bureau).
  - b. [ ] has been transmitted by the International Bureau.
  - c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US).
5. [X] A translation of the International Application into English (35 U.S.C. 371(c)(2)).
6. [ ] Amendments to the claims of the International Application under PCT Article 19 (35 U.S.C. 371(c)(3))
  - a. [ ] are transmitted herewith (required only if not transmitted by the International Bureau).
  - b. [ ] have been transmitted by the International Bureau.
  - c. [ ] is not required, as the application was filed in the United States Receiving Office (RO/US).
7. [ ] A translation of the amendments to the claims under PCT Article 19 (35 U.S.C. 371(c)(3)).
8. [ ] An oath or declaration of the inventor (35 U.S.C. 371(c)(4)).
9. [ ] A translation of the Annexes to the International Preliminary Examination Report under PCT Article 36 (35 U.S.C. 371(c)(5)).

Items 10-15 below concern document(s) or information included:

10. [X] An Information Disclosure Statement Under 37 CFR 1.97 and 1.98.
11. [ ] An assignment document for recording.
 

Please mail the recorded assignment document to:

  - a. [ ] the person whose signature, name & address appears at the bottom of this document.
  - b. [ ] the following:
12. [X] A preliminary amendment.
13. [X] A substitute specification
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	BASIC NATIONAL FEE (37 CFR 1.492(a)(1)-(4):				890.00
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	[ ] International preliminary examination fee paid to USPTO (37 CFR 1.482) and all claims satisfied provisions of PCT Article 33(2) to (4) .....\$ 100				
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PATENT TRADEMARK OFFICE

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REGISTRATION NO. 31,106

10/1/01

DATE

**Substitute Specification**

## TITLE OF THE INVENTION

## APPARATUS AND METHOD FOR MOBILE DATA ACQUISITION

## BACKGROUND OF THE INVENTION

## 1. Field of the Invention

[0001] The invention relates to an apparatus for data acquisition using at least one input interface for supplying input signals, in particular operating data relating to a vehicle, a machine etc., having a signal processing apparatus, which can be coupled to the input interface, for signal processing of the input signals which are supplied via the input interface.

[0002] The invention also relates to a method for data acquisition of input signals which are supplied via at least one input interface, in particular of operating data relating to a vehicle, a machine etc., in which the input interface is coupled to a signal processing apparatus for signal processing of the input signals which are supplied via the input interface.

## 2. Description of the Related Art

[0003] Data acquisition apparatuses are commonly used in vehicles, for example passenger vehicles, commercial vehicles, construction-industry machines, agricultural machines etc. In this case, systematic operating data acquisition and monitoring of the vehicles is frequently desirable.

[0004] Such an apparatus is disclosed in GB 2,194,119 A1. The data detection apparatus in this case contains input sensors, which record the status or specific safety or security conditions. Furthermore, a signal processing apparatus is provided, which produces a status report which includes the identity and the location of the data detection apparatus, as well as the respective operating data. The data detection apparatus is connected to a selector and to a radio telephone, which transmits the status report to a remote station.

## SUMMARY OF THE INVENTION

**[0005]** The invention is based on the object of specifying an apparatus and a method for data acquisition, which allow automated and systematic data acquisition and the passing on of process data, alarm messages etc. in a simple manner, particularly for use with or in a vehicle or machine.

**[0006]** This object is achieved by an apparatus for data acquisition having at least one input interface for supplying input signals, in particular operating data relating to a vehicle, a machine etc., having a signal processing apparatus, which can be coupled to the input interface, for signal processing of the input signals which are supplied via the input interface or interfaces, and for recording data which can be predetermined in the input signals at times which can be predetermined, and having an output interface for supplying output data, which is derived from the input signals in the signal processing apparatus in accordance with rules which can be predetermined, from the signal processing apparatus to a signal conditioning apparatus for conditioning the output data to a transmitting/receiving unit, which can be coupled to the apparatus, for automatic transmission, and/or transmission initiated on request, of the output data to a control center and/or to a predetermined receiver.

**[0007]** This object is achieved by a method for data acquisition of input signals which are supplied via at least one input interface, in particular of operating data relating to a vehicle, a machine etc., in which the input interface is coupled to a signal processing apparatus for signal processing of the input signals which are supplied via the input interface, in which data which can be predetermined in the input signals are recorded by the signal processing apparatus at times which can be predetermined, and output data is derived from the input signals in the signal processing apparatus in accordance with rules which can be predetermined, which output data is passed on automatically to a transmitting/receiving unit which can be coupled to the signal processing apparatus and/or on request to a control center and/or to a predetermined addressee.

**[0008]** The invention is based on the knowledge that use of a mobile data acquisition apparatus, in particular in the field of complex construction-industry machines, construction-industry vehicles and commercial vehicles etc., allows systematic data acquisition which leads, overall, to better availability of the respective vehicles etc. To achieve this, the data acquisition apparatus is supplied via the input interface with the respective input signals required for

evaluation and diagnosis. This input data in the input signals is evaluated in the signal processing apparatus in the data acquisition apparatus, either during operation of the respective vehicle or else when the vehicle is stationary, in accordance with previously defined rules which are stored in the signal processing apparatus, and is passed on either automatically or on request, for example from a control center, via the transmitting/receiving unit to a specific addressee or to the control center. The control center, which is responsible, for example, for a specific fleet of vehicles, in this way has a comprehensive overview of the respective machine states and of the measured values from the vehicles so that, for example, it is possible to identify technical defects at an early stage, relating to the operational reliability or safety and availability of the respective vehicle. Furthermore, this also allows the respective servicing intervals to be optimized on a vehicle-specific basis. The rules required for evaluation of the respective input data are stored in the signal processing apparatus and can in each case be individually matched to the respective vehicle etc. and to the respective specific operating conditions.

**[0009]** One simple and cost-effective option for configuration of the data acquisition apparatus can be achieved by the apparatus having at least one memory which can be written to, for storage of an operating system for the apparatus and/or of the rules which can be predetermined, in which case the memory data intended for that memory can be loaded remotely via the transmitting/receiving unit.

**[0010]** Effective data processing by the signal processing apparatus can be achieved independently of the respective data format of the input signals by the apparatus having a data converter, which is arranged between the input interface and the signal processing apparatus and is used to remove distortion from the supplied input signals and to provide a standard data format for the input signals which are supplied via the input interface or interfaces.

**[0011]** The input data can be additionally conditioned with regard to the specific addresses by the apparatus having an address allocation unit, which is provided between the data converter and the input interface or interfaces, and is intended for conversion of the source-specific addresses in the input signals to the address format of the data converter.

**[0012]** Data recording and analysis can be made possible, in a similar way to an oscilloscope, by the signal processing apparatus having a data analysis unit, which is intended for recording of selected input signals at times which can be predetermined, with the recording rules being

defined in advance by the control center from the short-term monitoring of information which can be derived from the input signals. An energy-saving mode for the apparatus, which is of major importance during mobile use, can be achieved by the apparatus being installed in a mobile vehicle that is powered by a motor or engine, and has a connecting apparatus for connection to the supply voltage in the vehicle, by the apparatus having means for detection of at least one "Generator of the supply voltage source in operation" first operating mode and of at least one "Generator of the supply voltage source not in operation" second operating mode, with the work of the data analysis unit being interrupted in the second operating mode. Alarm monitoring and long-term data acquisition can continue to run in this case.

**[0013]** User-friendly monitoring and objective diagnosis based on the input signals which can be processed by the mobile data acquisition apparatus can be carried out, in particular for long-term evaluation purposes, by the signal processing apparatus having a data processing unit for recording information data which can be derived from the input signals in accordance with rules which can be predetermined, and by the apparatus having a first memory for storage of the rules for the data processing unit.

**[0014]** The power management of the data acquisition apparatus is further improved by the first memory having two memory areas, with a first memory area containing the rules for the "Generator of the supply voltage source in operation" operating mode, and a second memory area containing the rules for the "Generator of the supply voltage source not in operation" operating mode.

**[0015]** An alarm function can be produced for the data acquisition apparatus by the signal processing apparatus having an alarm unit for monitoring information data which can be derived from the input signals in accordance with alarm rules which can be predetermined, and by the apparatus having a second memory for storage of the rules for the alarm unit.

**[0016]** The respective alarms produced can be monitored, for example for statistical evaluation purposes, by the apparatus having an alarm archive for entering alarms that have occurred.

**[0017]** The input signals which are gathered in the data acquisition apparatus and can also be checked via an on-line link, together with the information which can be derived from these signals, is monitored by the signal processing apparatus having a monitoring unit for direct monitoring of input signals and/or of information data which can be derived from the input signals.

**[0018]** An additional action for control and monitoring purposes is provided by the monitoring unit, as the control and monitoring unit, also having control signals, which can be fed in via the input/output interface or interfaces for direct control of operating modes of a vehicle which is coupled to the apparatus.

**[0019]** The options for use of the data acquisition apparatus, as well as the conditioning of the input data, can be further enlarged or extended by the apparatus having the capability to be coupled to a GPS receiver.

**[0020]** One data acquisition implementation, which also involves multiple use of components, can be provided particularly advantageously and in a particularly cost-saving manner by the apparatus being integrated in, and hence coupled to, a car radio receiver and/or a car radio receiver/mobile telephone appliance combination.

#### BRIEF DESCRIPTION OF THE DRAWINGS

**[0021]** The invention will be described and explained in more detail in the following text with reference to the exemplary embodiments which are illustrated in the figures, in which:

Figure 1 is a block diagram of an exemplary embodiment of an overall system for mobile data acquisition,

Figure 2 is a functional block diagram of the data acquisition apparatus,

Figure 3 is a block diagram of an exemplary embodiment of a data acquisition apparatus,

Figure 4 is an overview of an example of configuration data for a data acquisition apparatus, and

Figure 5 is an example of an input screen for setting rules in a data analysis unit.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

**[0022]** Figure 1 is a block diagram of an exemplary embodiment of an overall system for mobile data acquisition. The data acquisition system comprises vehicles F1..Fn in a vehicle fleet. The vehicles F1..Fn are each equipped with a data acquisition apparatus MC, although the data acquisition apparatus MC and the interaction with further components in the respective vehicle F1..Fn being illustrated only with respect to the vehicle F1 in Fig. 1. The data acquisition apparatus MC has input interfaces S1..S4, via which respective input signals I1..I4 are supplied

from data sources Q1..Q4. The first interface S1 is intended, for example, for processing input signals from a communication bus, such as the CAN bus (CAN = Controller Area Network) used in vehicles. Operating data for the engine temperature, water temperature, oil pressure, oil temperature, battery voltage etc. are transmitted, for example, via such a data bus. The second interface S2 is, for example, in the form of a serial interface, for example for connection of a keyboard or keypad etc., while the third interface S3, for example in the form of an "on-board I/O" interface, is intended, for example, for the connection of sensors, encoders etc. The fourth interface S4 is used for optional connection of a GPS module (GPS = Global Positioning System). The data acquisition apparatus MC has an output interface SA, which is coupled to a transmitting/receiving unit 5, for example a GSM module (GSM = Global System for Mobile Communication). The GSM module 5 is connected to a transmitting/receiving antenna 6. The vehicle F1 can set up a bi-directional data link via a radio interface 9 between the antenna 6 of the data acquisition apparatus MC and an antenna 11 of a base station 10a..10n. The base stations 10a..10n in a GSM mobile radio network N are connected to a network operator 13 for the mobile radio network N. There is a link 14 from the operator 13 of the mobile radio network N to a control center 15. A further data link is possible, alternatively or in addition, as a mobile data link 16 via a further base station 17 between a receiver E and the operator 13, as a mobile data link 12. A computer 20 having a data processing apparatus 22, a monitor 21 and a keyboard or keypad 23 is used, for example, as the man-machine interface for communication between the control center 15 and the data acquisition apparatus MC.

**[0023]** Figure 1 shows how the data acquisition apparatus MC is embedded within a system for monitoring and diagnosis of vehicles F1..Fn. Instead of the vehicles F1..Fn illustrated in Figure 1, other, both mobile and stationary, vehicles and machines, such as construction-industry vehicles, cranes, containers, tracked vehicles etc., can also be included within such a system. As will be explained in even more detail below with reference to Figure 3, the data acquisition apparatus MC records specific input signals I1..I4 over a relatively long time period. Thus, for example, signals which relate to the operational safety or reliability of the vehicle F1..Fn, such as the water temperature, oil temperature, refrigeration temperature of a refrigerated vehicle etc., can be recorded at specific times in accordance with the rules stored in the data acquisition apparatus MC. The signals recorded in this way can then be transmitted via the output interface, either on request by the control center 15 or on request by any other receiver E, via the output interface SA and the radio transmitting/receiving unit 5 connected to it, to the control center 15 and/or to the receiver E. This allows effective fault diagnosis, for example in the event



of a defect in the vehicle F1..Fn. Furthermore, it is possible likewise to record specific input signals I1..I4 in the data acquisition apparatus MC over a short time period, for example being started and stopped by trigger events, and hence to obtain highly up-to-date machine/vehicle states on the basis of a very up-to-date display, and to initiate appropriate maintenance and/or repair measures etc. Signals can also be recorded over a short time period, for example, in the form of a direct dialogue link between the control center 15 and the data acquisition apparatus MC, via an on-line link in the form of the air interface 9. The rules in the data acquisition apparatus MC can be constructed such that an alarm signal can also be produced automatically when specific defect events occur, for example when limit values are exceeded. Furthermore, the data acquisition apparatus MC can transmit location data to the control center, based on the location data supplied via the GPS data source Q4. Firstly, this provides theft monitoring and, secondly, it allows a vehicle fleet F1..Fn to be managed with a clear overview of the vehicles to be covered by the control center 15. Furthermore, a voice link is also possible, when required, between the driver of the vehicle F1 and the control center 15 via the radio link 9 between the control center 15 and the vehicle F1, without any separate radio transmitting/receiving apparatus being required for this purpose. Furthermore, for example in the event of a fault, a notebook etc., for example, can also be connected on site via the interface S2, thus allowing the recorded signals to be evaluated on site for fault tracing. The information transmitted from the data acquisition apparatus MC to the control center 15 can be displayed in an optimum manner by installing in the computer device 22 a software packet which is based, for example, on the Siemens WinCC control and monitoring system, or on operating systems such as Windows. This also optimizes administration, for example of the incoming alarm signals. Furthermore, specific information for the vehicles F1..Fn, for example traffic radio, data and/or order data etc., can be transmitted from the control center on a vehicle-specific or fleet-specific basis. The rules in the data acquisition apparatus MC for acquisition and transmission of input signal data 1a..4a to the control center are stored in the data acquisition apparatus MC such that the rules can be loaded remotely from the control center 15 in the data acquisition apparatus MC via the air interface 9.

**[0024]** Figure 2 is a functional block diagram of a data acquisition apparatus, in which case this structure will also be explained in more detail with reference to the more detailed outline illustration in Figure 3.

**[0025]** Figure 2 is a functional block diagram relating to the data acquisition and data processing in data acquisition apparatus MC. The data acquisition apparatus MC has input

interfaces S1..S4, as has already been explained in principle with reference to Figure 1. The first interface S1 is, for example, in the form of a CAN interface (CAN = Controller Area Network). In the exemplary embodiment illustrated in Figure 3, the second interface S2 is in the form of a serial interface, for example for connection of a keyboard or keypad, while the third interface S3 is in the form of an on-board input/output interface, for example for connection of sensors, encoders etc. The fourth interface S4 is used for connection of the data from a GPS module (GPS = Global Positioning System). The input signals I1..I4 supplied via the interfaces S1..S4 are passed on via an address allocation unit AZ and a data converter EA to a signal processing apparatus 1. The signal processing apparatus 1 has an output interface SA, via which output signals 18 are passed on to a communication driver KT, for example a GSM driver. The signal processing apparatus 16 contains means A, L, D, M for recording and monitoring input signals I1..I4, which can be predetermined, at times which can be predetermined. In detail, the means L, A, D, M comprise a data analysis unit D, which is intended for recording selected input signals I1..I4 at times which can be predetermined, with the recording rules for short-term monitoring of information which can be derived from the input signals 1a..4a being defined in advance from the control center. The corresponding rules are stored in a data analysis rule interpreter DR. The rules which are stored in the memory DR can be loaded remotely via the output interface SA, via a link D1. The data signals d determined by means of the data analysis unit D are recorded by means of the recording apparatus DA and a data buffer DP. The data processing unit L is constructed in a similar way. The data processing unit L also contains a memory LR for storage of the rules for recording the input signals 1 to be processed by means of the data processing unit L. A preprocessing unit LV, a data recording unit LA and a data buffer LP are also provided. Further processing units in the signal processing apparatus 16 are the alarm unit A for monitoring information data which can be derived from the input signals 1a..4a in accordance with alarm rules which can be predetermined. The alarm unit A comprises a memory AR for storage of the alarm monitoring rules. The alarms are monitored by evaluation of the alarm signals a supplied to the alarm unit, which are passed on to an alarm monitoring unit AÜ and an alarm archive AA.

**[0026]** The method of operation of the mobile data acquisition apparatus illustrated in Figure 2 will be explained in more detail in the following text with reference to the respective function blocks. The address allocation unit AZ is formed from address allocation tables, which carry out the conversion process between source-specific addresses and the input map of the data converter EA. The address allocation tables in the address allocation unit AZ are set up on the

basis of the source and on the basis of the supplied input signals I1..I4, and are thus also different. However, the definition of the format (bit, byte, word...), address in the respective input/output map of the data converter EA, bit offset for bit types and, if necessary, the length, are common to them. In order to save addressing space, the data converter EA is separated into data format areas in which the data received via the different sources is entered as an input map. The data converter EA has the tasks of removing distortion between the asynchronous delivery of the data by the sources, and evaluation by means of the downstream signal processing apparatus 1. A further task is for the data converter EA to provide the data using a standard interface, irrespective of the source, and with a standard data format. The central element for long-term data acquisition and data monitoring is formed by the data analysis unit D, which is also referred to as the data analyzer in the following text. The data analysis unit D operates in a similar way to an oscilloscope, that is to say individual selected signals are recorded at defined times. The recording process can in each case be started or stopped by means of the recording rules DR. In contrast to the data processing unit L, the data analysis unit D is used for short-term monitoring of events as they occur. The corresponding rules DR for this short-term monitoring are thus chosen such that the recording of the data signals by means of the recording unit DA takes place only in a "Generator of the supply voltage source in the vehicle in operation" operating mode, or only in an "ignition ON" operating mode. This ensures that the battery voltage of the vehicle in which the data acquisition apparatus MC is arranged is not loaded unnecessarily. It can be seen from the data link D1 that the rules in the data analysis unit D are transferred from a control center to the data acquisition apparatus MC for the running time. By way of example, Figure 5 shows an example of an input screen or mask for setting the recording rules for the data analysis unit D.

**[0027]** The functionality of the data processing unit L corresponds essentially to the functionality of the data analysis unit D. In contrast to the data analysis unit D, the data processing unit L is used for recording data over a relatively long time period in accordance with the predetermined rules LR. Such rules may be, for example: averaging, maximum-value formation, minimum-value formation. The rules LR can be stored by a control center in an appropriate parameter/configuration area. There are also two rule areas in the case of the data processing unit L, namely one rule area for the normal operating mode, and one for what is referred to as the power-safe operating mode. The power-safe operating mode describes the "Generator of the supply voltage source not in operation" operating mode, which generally corresponds to the engine/motor OFF operating mode. The data preprocessing unit LV is used for preprocessing

(integration, minimum/maximum-value formation) of the events sampled in the appropriate recording time frame.

**[0028]** The alarm signaling system A essentially has two parts: the alarm archive AA and the alarm monitoring AÜ. The alarm signaling system A monitors signals from the input map of the data converter EA and produces alarm messages. The alarm monitoring AÜ checks the input map, controlled with respect to time and in accordance with the alarm monitoring rules AR, for events that need to be reported. If an alarm situation is identified in this case, then an appropriate alarm message is entered in the alarm archive AA. The alarm monitoring rules AR in this case define when an alarm must be identified as incoming or outgoing. An alarm message may, for example, be passed on via the GSM driver and a radio transmitting unit coupled to it as an SMS message (SMS = Short Message Service) to the control center or to a predetermined receiver (see Figure 1). The alarm signaling system is also used to monitor the acknowledgement of the alarms that occur.

**[0029]** A further element of the signal processing apparatus 16 is the data monitoring unit M, which allows on-line monitoring of values via a control center.

**[0030]** The output interface SA is in the form of a data request interface, and forms a neutral interface between the functionalities of the data acquisition apparatus MC and the communication driver for the operating station, for example for the corresponding control and monitoring system in a control center. The communication driver AT manages the downstream communication medium, for example a control and monitoring system WinCC, and converts the address messages, which are specific to the respective control and monitoring system, to the output interface SA.

**[0031]** Figure 4 provides an overview of an example of configuration data for a data acquisition apparatus. The configuration database DB contains the configuration data required for the overall system. This database is used to generate the databases DB1, DB2,... required for the individual components. The first database DB1 contains the configuration data required for the data acquisition unit. The databases Q1..Qn in the data sources control the behavior of the behavior of the data sources. The alarm system A defines the rules for alarm monitoring. The databases LR1, LR2 define the recording rules for the data processing unit L (see Figure 3). Furthermore, a can be provided for the database, which is not illustrated in Figure 4, for a classification unit K, defining the classification rules for a classification unit K. The task of the

classification unit K is to assess a signal over a relatively long time period. The signal status is allocated to configurable classes. For example, one signal may be subdivided into 10 classes. If, for example, the signal value range is from 0 to 999 and 10 classes of equal size are configured, each class contains a value range of 100. The first class represents the range from 0 to 99, the second the range from 100 to 199, etc. The result is then: signal for 140 s in class 1, for 20 s in class 2 etc. The second database DB2, which is managed in the control center, relates to the alarm archive AA and symbol management used for the symbol management required in conjunction with the data analysis unit D, the data processing unit L, the classification unit K and the data monitoring unit M.

**[0032]** The configuration database DB can be produced in a simple manner, for example in the form of EXCEL tables, or using a graphical configuration tool. At least certain parts of the configuration database DB may contain data that can be loaded retrospectively from the control center and can thus be matched to new monitoring models etc.

**[0033]** Figure 5 shows an example of an input mask for producing rules for a data analysis unit. The input mask M contains a first input field EF1 for presetting the respective input signals to be recorded, and a second input field EF2 for presetting the respective recording rules. The respective signals to be recorded (oil pressure, engine speed, water temperature) are defined in the first input field EF1, together with the time frame for the recording of the signals. The second input field EF2 is used to preset the respective recording rules, for example the engine speed must be recorded when the value is greater than 50.

**[0034]** In summary, the invention thus relates to an apparatus MC and a method for, in particular mobile, data acquisition having at least one input interface S1..S4 for supplying input signals I1..I4, in particular data relating to a vehicle F1..Fn, a machine etc., having a signal processing apparatus 16, which can be coupled to the input interface S1..S4, for signal processing of the data supplied via the input interface S1..S4, and having an output interface SA for supplying output data 17 from the signal processing apparatus 16 to a transmission apparatus 5 for transmitting the output data 17 to a control center 15. Automated and systematic data acquisition for process data acquisition, alarm signaling etc. can thus be achieved in a simple manner by the signal processing apparatus 16 having means A, L, D for recording and assessment of input data I1..I4, which can be predetermined, at times which can be predetermined.

[illegible]

## APPARATUS AND METHOD FOR MOBILE DATA ACQUISITION

12

## Marked-up Substitute Specification

[Description]

### TITLE OF THE INVENTION

APPARATUS AND METHOD FOR[, IN PARTICULAR] MOBILE[,] DATA ACQUISITION

### BACKGROUND OF THE INVENTION

#### 1. Field of the Invention

[0001] The invention relates to an apparatus for[, in particular mobile,] data acquisition [having] using at least one input interface for supplying input signals, in particular operating data relating to a vehicle, a machine etc., having a signal processing apparatus, which can be coupled to the input interface, for signal processing of the input signals which are supplied via the input interface.

[0002] The invention also relates to a method for[, in particular mobile,] data acquisition of input signals which are supplied via at least one input interface, in particular of operating data relating to a vehicle, a machine etc., in which the input interface is coupled to a signal processing apparatus for signal processing of the input signals which are supplied via the input interface.

#### 2. Description of the Related Art

[0003] [Such an apparatus is] Data acquisition apparatuses are commonly used[, for example,] in vehicles, for example passenger vehicles, commercial vehicles, construction-industry machines, agricultural machines etc. In this case, systematic operating data acquisition and monitoring of the vehicles is frequently desirable.

[0004] Such an apparatus is disclosed in GB 2,194,119 A1. The data detection apparatus in this case contains input sensors, which record the status or specific safety or security conditions. Furthermore, a signal processing apparatus is provided, which produces a status report which includes the identity and the location of the data detection apparatus, as well as the respective operating data. The data detection apparatus is connected to a selector and to a radio telephone, which transmits the status report to a remote station.

## SUMMARY OF THE INVENTION

**[0005]** The invention is based on the object of specifying an apparatus and a method for[, in particular mobile,] data acquisition, which allow automated and systematic data acquisition and the passing on of process data, alarm messages etc. in a simple manner, particularly for use with or in a vehicle or machine.

**[0006]** This object is achieved by an apparatus for[, in particular mobile,] data acquisition having at least one input interface for supplying input signals, in particular operating data relating to a vehicle, a machine etc., having a signal processing apparatus, which can be coupled to the input interface, for signal processing of the input signals which are supplied via the input interface or interfaces, and for recording data which can be predetermined in the input signals at times which can be predetermined, and having an output interface for supplying output data, which is derived from the input signals in the signal processing apparatus in accordance with rules which can be predetermined, from the signal processing apparatus to a signal conditioning apparatus for conditioning the output data to a transmitting/receiving unit, which can be coupled to the apparatus, for automatic transmission, and/or transmission initiated on request, of the output data to a control center and/or to a predetermined receiver.

**[0007]** This object is achieved by a method for[, in particular mobile,] data acquisition of input signals which are supplied via at least one input interface, in particular of operating data relating to a vehicle, a machine etc., in which the input interface is coupled to a signal processing apparatus for signal processing of the input signals which are supplied via the input interface, in which data which can be predetermined in the input signals are recorded by the signal processing apparatus at times which can be predetermined, and output data is derived from the input signals in the signal processing apparatus in accordance with rules which can be predetermined, which output data is passed on automatically to a transmitting/receiving unit which can be coupled to the signal processing apparatus and/or on request to a control center and/or to a predetermined addressee.

**[0008]** The invention is based on the knowledge that use of a mobile data acquisition apparatus, in particular in the field of complex construction-industry machines, construction-industry vehicles and commercial vehicles etc., allows systematic data acquisition which leads, overall, to better availability of the respective vehicles etc. To achieve this, the data acquisition apparatus is supplied via the input interface with the respective input signals required for



evaluation and diagnosis. This input data in the input signals is evaluated in the signal processing apparatus in the data acquisition apparatus, either during operation of the respective vehicle or else when the vehicle is stationary, in accordance with previously defined rules which are stored in the signal processing apparatus, and is passed on either automatically or on request, for example from a control center, via the transmitting/receiving unit to a specific addressee or to the control center. The control center, which is responsible, for example, for a specific fleet of vehicles, in this way has a comprehensive overview of the respective machine states and of the measured values from the vehicles so that, for example, it is possible to identify technical defects at an early stage, relating to the operational reliability or safety and availability of the respective vehicle. Furthermore, this also allows the respective servicing intervals to be optimized on a vehicle-specific basis. The rules required for evaluation of the respective input data are stored in the signal processing apparatus and can in each case be individually matched to the respective vehicle etc. and to the respective specific operating conditions.

**[0009]** One simple and cost-effective option for configuration of the data acquisition apparatus can be achieved by the apparatus having at least one memory which can be written to, for storage of an operating system for the apparatus and/or of the rules which can be predetermined, in which case the memory data intended for that memory can be loaded remotely via the transmitting/receiving unit.

**[0010]** Effective data processing by the signal processing apparatus can be achieved independently of the respective data format of the input signals by the apparatus having a data converter, which is arranged between the input interface and the signal processing apparatus and is used to remove distortion from the supplied input signals and to provide a standard data format for the input signals which are supplied via the input interface or interfaces.

**[0011]** The input data can be additionally conditioned with regard to the specific addresses by the apparatus having an address allocation unit, which is provided between the data converter and the input interface or interfaces, and is intended for conversion of the source-specific addresses in the input signals to the address format of the data converter.

**[0012]** Data recording and analysis can be made possible, in a similar way to an oscilloscope, by the signal processing apparatus having a data analysis unit, which is intended for recording of selected input signals at times which can be predetermined, with the recording rules being

defined in advance by the control center from the short-term monitoring of information which can be derived from the input signals. An energy-saving mode for the apparatus, which is of major importance during mobile use, can be achieved by the apparatus being installed in a mobile vehicle that is powered by a motor or engine, and has a connecting apparatus for connection to the supply voltage in the vehicle, by the apparatus having means for detection of at least one "Generator of the supply voltage source in operation" first operating mode and of at least one "Generator of the supply voltage source not in operation" second operating mode, with the work of the data analysis unit being interrupted in the second operating mode. Alarm monitoring and long-term data acquisition can continue to run in this case.

**[0013]** User-friendly monitoring and objective diagnosis based on the input signals which can be processed by the mobile data acquisition apparatus can be carried out, in particular for long-term evaluation purposes, by the signal processing apparatus having a data processing unit for recording information data which can be derived from the input signals in accordance with rules which can be predetermined, and by the apparatus having a first memory for storage of the rules for the data processing unit.

**[0014]** The power management of the data acquisition apparatus is further improved by the first memory having two memory areas, with a first memory area containing the rules for the "Generator of the supply voltage source in operation" operating mode, and a second memory area containing the rules for the "Generator of the supply voltage source not in operation" operating mode.

**[0015]** An alarm function can be produced for the data acquisition apparatus by the signal processing apparatus having an alarm unit for monitoring information data which can be derived from the input signals in accordance with alarm rules which can be predetermined, and by the apparatus having a second memory for storage of the rules for the alarm unit.

**[0016]** The respective alarms produced can be monitored, for example for statistical evaluation purposes, by the apparatus having an alarm archive for entering alarms that have occurred.

**[0017]** The input signals which are gathered in the data acquisition apparatus and can also be checked via an on-line link, together with the information which can be derived from these signals, is monitored by the signal processing apparatus having a monitoring unit for direct monitoring of input signals and/or of information data which can be derived from the input signals.

[0018] An additional action for control and monitoring purposes is provided by the monitoring unit, as the control and monitoring unit, also having control signals, which can be fed in via the input/output interface or interfaces for direct control of operating modes of a vehicle which is coupled to the apparatus.

[0019] The options for use of the data acquisition apparatus, as well as the conditioning of the input data, can be further enlarged or extended by the apparatus having the capability to be coupled to a GPS receiver.

[0020] One data acquisition implementation, which also involves multiple use of components, can be provided particularly advantageously and in a particularly cost-saving manner by the apparatus being integrated in, and hence coupled to, a car radio receiver and/or a car radio receiver/mobile telephone appliance combination.

#### BRIEF DESCRIPTION OF THE DRAWINGS

[0021] The invention will be described and explained in more detail in the following text with reference to the exemplary embodiments which are illustrated in the figures, in which:

Figure 1 [shows] is a block diagram of an exemplary embodiment of an overall system for mobile data acquisition,

Figure 2 [shows an illustration of the outline structure] is a functional block diagram of the data acquisition apparatus,

Figure 3 [shows an outline illustration] is a block diagram of an exemplary embodiment of a data acquisition apparatus,

Figure 4 [shows] is an overview of an example of configuration data for a data acquisition apparatus, and

Figure 5 [shows] is an example of [a mask] an input screen for setting rules in a data analysis unit.

#### DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENTS

[0022] Figure 1 [shows] is a block diagram of an exemplary embodiment of an overall system for mobile data acquisition. The data acquisition system comprises vehicles F1..Fn in a vehicle fleet. The vehicles F1..Fn are each equipped with a data acquisition apparatus MC, [with] although the data acquisition apparatus MC and the interaction with further components in the

respective vehicle F1..Fn being illustrated only with respect to the vehicle F1 in [each case] Fig. 1. The data acquisition apparatus MC has input interfaces S1..S4, via which respective input signals I1..I4 are supplied from data sources Q1..Q4. The first interface S1 is intended, for example, for processing input signals from a communication bus, such as the CAN bus (CAN = Controller Area Network) used in vehicles. Operating data for the engine temperature, water temperature, oil pressure, oil temperature, battery voltage etc. are transmitted, for example, via such a data bus. The second interface S2 is, for example, in the form of a serial interface, for example for connection of a keyboard or keypad etc., while the third interface S3, for example in the form of an "on-board I/O" interface, is intended, for example, for the connection of sensors, encoders etc. The fourth interface S4 is used for optional connection of a GPS module (GPS = Global Positioning System). The data acquisition apparatus MC has an output interface SA, which is coupled to a transmitting/receiving unit 5, for example a GSM module (GSM = Global System for Mobile Communication). The GSM module 5 is connected to a transmitting/receiving antenna 6. The vehicle F1 can set up a bi-directional data link via a radio interface 9 between the antenna 6 of the data acquisition apparatus MC and an antenna 11 of a base station 10a..10n. The base stations 10a..10n in a GSM mobile radio network N are connected to a network operator 13 for the mobile radio network N. There is a link 14 from the operator 13 of the mobile radio network N to a control center 15. A further data link is possible, alternatively or in addition, as a mobile data link 16 via a further base station 17 between a receiver E and the operator 13, as a mobile data link 12. A computer 20 having a data processing apparatus 22, a monitor 21 and a keyboard or keypad 23 is used, for example, as the man-machine interface for communication between the control center 15 and the data acquisition apparatus MC.

**[0023]** Figure 1 shows how the data acquisition apparatus MC is embedded within a system for monitoring and diagnosis of vehicles F1..Fn. Instead of the vehicles F1..Fn illustrated in Figure 1, other, both mobile and stationary, vehicles and machines, such as construction-industry vehicles, cranes, containers, tracked vehicles etc., can also be included within such a system. As will be explained in even more detail below with reference to Figure 3, the data acquisition apparatus MC records specific input signals I1..I4 over a relatively long time period. Thus, for example, signals which relate to the operational safety or reliability of the vehicle F1..Fn, such as the water temperature, oil temperature, refrigeration temperature of a refrigerated vehicle etc., can be recorded at specific times in accordance with the rules stored in the data acquisition apparatus MC. The signals recorded in this way can then be transmitted via the output

interface, either on request by the control center 15 or on request by any other receiver E, via the output interface SA and the radio transmitting/receiving unit 5 connected to it, to the control center 15 and/or to the receiver E. This allows effective fault diagnosis, for example in the event of a defect in the vehicle F1..Fn. Furthermore, it is possible likewise to record specific input signals I1..I4 in the data acquisition apparatus MC over a short time period, for example being started and stopped by trigger events, and hence to obtain highly up-to-date machine/vehicle states on the basis of a very up-to-date display, and to initiate appropriate maintenance and/or repair measures etc. Signals can also be recorded over a short time period, for example, in the form of a direct dialogue link between the control center 15 and the data acquisition apparatus MC, via an on-line link in the form of the air interface 9. The rules in the data acquisition apparatus MC can be constructed such that an alarm signal can also be produced automatically when specific defect events occur, for example when limit values are exceeded. Furthermore, the data acquisition apparatus MC can transmit location data to the control center, based on the location data supplied via the GPS data source Q4. Firstly, this provides theft monitoring and, secondly, it allows a vehicle fleet F1..Fn to be managed with a clear overview of the vehicles to be covered by the control center 15. Furthermore, a voice link is also possible, when required, between the driver of the vehicle F1 and the control center 15 via the radio link 9 between the control center 15 and the vehicle F1, without any separate radio transmitting/receiving apparatus being required for this purpose. Furthermore, for example in the event of a fault, a notebook etc., for example, can also be connected on site via the interface S2, thus allowing the recorded signals to be evaluated on site for fault tracing. The information transmitted from the data acquisition apparatus MC to the control center 15 can be displayed in an optimum manner by installing in the computer device 22 a software packet which is based, for example, on the Siemens WinCC control and monitoring system, or on operating systems such as Windows. This also optimizes administration, for example of the incoming alarm signals. Furthermore, specific information for the vehicles F1..Fn, for example traffic radio, data and/or order data etc., can be transmitted from the control center on a vehicle-specific or fleet-specific basis. The rules in the data acquisition apparatus MC for acquisition and transmission of input signal data 1a..4a to the control center are stored in the data acquisition apparatus MC such that the rules can be loaded remotely from the control center 15 in the data acquisition apparatus MC via the air interface 9.

[0024] Figure 2 [shows an overview of the outline structure] is a functional block diagram of a data acquisition apparatus, in which case this structure will also be explained in more detail with reference to the more detailed outline illustration in Figure 3.

[0025] Figure 2 [shows an outline illustration] is a functional block diagram relating to the data acquisition and data processing in [a] data acquisition apparatus MC. The data acquisition apparatus MC has input interfaces S1..S4, as has already been explained in principle with reference to Figure 1. The first interface S1 is, for example, in the form of a CAN interface (CAN = Controller Area Network). In the exemplary embodiment illustrated in Figure 3, the second interface S2 is in the form of a serial interface, for example for connection of a keyboard or keypad, while the third interface S3 is in the form of an on-board input/output interface, for example for connection of sensors, encoders etc. The fourth interface S4 is used for connection of the data from a GPS module (GPS = Global Positioning System). The input signals I1..I4 supplied via the interfaces S1..S4 are passed on via an address allocation unit AZ and a data converter EA to a signal processing apparatus 1. The signal processing apparatus 1 has an output interface SA, via which output signals 18 are passed on to a communication driver KT, for example a GSM driver. The signal processing apparatus 16 contains means A, L, D, M for recording and monitoring input signals I1..I4, which can be predetermined, at times which can be predetermined. In detail, the means L, A, D, M comprise a data analysis unit D, which is intended for recording selected input signals I1..I4 at times which can be predetermined, with the recording rules for short-term monitoring of information which can be derived from the input signals 1a..4a being defined in advance from the control center. The corresponding rules are stored in a data analysis rule interpreter DR. The rules which are stored in the memory DR can be loaded remotely via the output interface SA, via a link D1. The data signals d determined by means of the data analysis unit D are recorded by means of the recording apparatus DA and a data buffer DP. The data processing unit L is constructed in a similar way. The data processing unit L also contains a memory LR for storage of the rules for recording the input signals 1 to be processed by means of the data processing unit L. A preprocessing unit LV, a data recording unit LA and a data buffer LP are also provided. Further processing units in the signal processing apparatus 16 are the alarm unit A for monitoring information data which can be derived from the input signals 1a..4a in accordance with alarm rules which can be predetermined. The alarm unit A comprises a memory AR for storage of the alarm monitoring rules. The alarms are monitored by evaluation of the alarm signals a supplied to the alarm unit, which are passed on to an alarm monitoring unit AÜ and an alarm archive AA.

**[0026]** The method of operation of the mobile data acquisition apparatus illustrated in Figure 2 will be explained in more detail in the following text with reference to the respective function blocks. The address allocation unit AZ is formed from address allocation tables, which carry out the conversion process between source-specific addresses and the input map of the data converter EA. The address allocation tables in the address allocation unit AZ are set up on the basis of the source and on the basis of the supplied input signals I1..I4, and are thus also different. However, the definition of the format (bit, byte, word...), address in the respective input/output map of the data converter EA, bit offset for bit types and, if necessary, the length, are common to them. In order to save addressing space, the data converter EA is separated into data format areas in which the data received via the different sources is entered as an input map. The data converter EA has the tasks of removing distortion between the asynchronous delivery of the data by the sources, and evaluation by means of the downstream signal processing apparatus 1. A further task is for the data converter EA to provide the data using a standard interface, irrespective of the source, and with a standard data format. The central element for long-term data acquisition and data monitoring is formed by the data analysis unit D, which is also referred to as the data analyzer in the following text. The data analysis unit D operates in a similar way to an oscilloscope, that is to say individual selected signals are recorded at defined times. The recording process can in each case be started or stopped by means of the recording rules DR. In contrast to the data processing unit L, the data analysis unit D is used for short-term monitoring of events as they occur. The corresponding rules DR for this short-term monitoring are thus chosen such that the recording of the data signals by means of the recording unit DA takes place only in a "Generator of the supply voltage source in the vehicle in operation" operating mode, or only in an "ignition ON" operating mode. This ensures that the battery voltage of the vehicle in which the data acquisition apparatus MC is arranged is not loaded unnecessarily. It can be seen from the data link D1 that the rules in the data analysis unit D are transferred from a control center to the data acquisition apparatus MC for the running time. By way of example, Figure 5 shows an example of [a] an input screen or mask for setting the recording rules for the data analysis unit D.

**[0027]** The functionality of the data processing unit L corresponds essentially to the functionality of the data analysis unit D. In contrast to the data analysis unit D, the data processing unit L is used for recording data over a relatively long time period in accordance with the predetermined rules LR. Such rules may be, for example: averaging, maximum-value formation, minimum-value formation. The rules LR can be stored by a control center in an appropriate

parameter/configuration area. There are also two rule areas in the case of the data processing unit L, namely one rule area for the normal operating mode, and one for what is referred to as the power-safe operating mode. The power-safe operating mode describes the "Generator of the supply voltage source not in operation" operating mode, which generally corresponds to the engine/motor OFF operating mode. The data preprocessing unit LV is used for preprocessing (integration, minimum/maximum-value formation) of the events sampled in the appropriate recording time frame.

**[0028]** The alarm signaling system A essentially has two parts: the alarm archive AA and the alarm monitoring AÜ. The alarm signaling system A monitors signals from the input map of the data converter EA and produces alarm messages. The alarm monitoring AÜ checks the input map, controlled with respect to time and in accordance with the alarm monitoring rules AR, for events that need to be reported. If an alarm situation is identified in this case, then an appropriate alarm message is entered in the alarm archive AA. The alarm monitoring rules AR in this case define when an alarm must be identified as incoming or outgoing. An alarm message may, for example, be passed on via the GSM driver and a radio transmitting unit coupled to it as an SMS message (SMS = Short Message Service) to the control center or to a predetermined receiver (see Figure 1). The alarm signaling system is also used to monitor the acknowledgement of the alarms that occur.

**[0029]** A further element of the signal processing apparatus 16 is the data monitoring unit M, which allows on-line monitoring of values via a control center.

**[0030]** The output interface SA is in the form of a data request interface, and forms a neutral interface between the functionalities of the data acquisition apparatus MC and the communication driver for the operating station, for example for the corresponding control and monitoring system in a control center. The communication driver AT manages the downstream communication medium, for example a control and monitoring system WinCC, and converts the address messages, which are specific to the respective control and monitoring system, to the output interface SA.

**[0031]** Figure 4 [shows] provides an overview of an example of configuration data for a data acquisition apparatus. The configuration database DB contains the configuration data required for the overall system. This database is used to generate the databases DB1, DB2,... required for the individual components. The first database DB1 contains the configuration data required



for the data acquisition unit. The databases Q1..Qn in the data sources control the behavior of the behavior of the data sources. The alarm system A defines the rules for alarm monitoring. The databases LR1, LR2 define the recording rules for the data processing unit L (see Figure 3). Furthermore, a can be provided for the database, which is not illustrated in Figure 4, for a classification unit K, defining the classification rules for a classification unit K. The task of the classification unit K is to assess a signal over a relatively long time period. The signal status is allocated to configurable classes. For example, one signal may be subdivided into 10 classes. If, for example, the signal value range is from 0 to 999 and 10 classes of equal size are configured, each class contains a value range of 100. The first class represents the range from 0 to 99, the second the range from 100 to 199, etc. The result is then: signal for 140 s in class 1, for 20 s in class 2 etc. The second database DB2, which is managed in the control center, relates to the alarm archive AA and symbol management used for the symbol management required in conjunction with the data analysis unit D, the data processing unit L, the classification unit K and the data monitoring unit M.

**[0032]** The configuration database DB can be produced in a simple manner, for example in the form of EXCEL tables, or using a graphical configuration tool. At least certain parts of the configuration database DB may contain data that can be loaded retrospectively from the control center and can thus be matched to new monitoring models etc.

**[0033]** Figure 5 shows an example of an input mask for producing rules for a data analysis unit. The input mask M contains a first input field EF1 for presetting the respective input signals to be recorded, and a second input field EF2 for presetting the respective recording rules. The respective signals to be recorded (oil pressure, engine speed, water temperature) are defined in the first input field EF1, together with the time frame for the recording of the signals. The second input field EF2 is used to preset the respective recording rules, for example the engine speed must be recorded when the value is greater than 50.

**[0034]** In summary, the invention thus relates to an apparatus MC and a method for, in particular mobile, data acquisition having at least one input interface S1..S4 for supplying input signals I1..I4, in particular data relating to a vehicle F1..Fn, a machine etc., having a signal processing apparatus 16, which can be coupled to the input interface S1..S4, for signal processing of the data supplied via the input interface S1..S4, and having an output interface SA for supplying output data 17 from the signal processing apparatus 16 to a transmission apparatus 5 for transmitting the output data 17 to a control center 15. Automated and



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Docket No. 1454.1102/RAG

**IN THE UNITED STATES PATENT AND TRADEMARK OFFICE**

In re Application of:

Knut ADAMS et al.

Serial No. (Unassigned)

Group Art Unit: To be assigned

Confirmation No.

Filed: (concurrently)

Examiner: To be assigned

For: DEVICE AND METHOD FOR MOBILE DATA COLLECTION (as amended)

**PRELIMINARY AMENDMENT**

Assistant Commissioner for Patents  
Washington, D.C. 20231

Sir:

Before examination of the above-identified application, please amend the application as follows:

**IN THE TITLE**

Please delete "ESPECIALLY" and "THE".

**IN THE SPECIFICATION**

Please REPLACE the pending specification with the Substitute Specification attached hereto.

**IN THE ABSTRACT**

Please REPLACE the originally filed Abstract with the enclosed Substitute Abstract.

**IN THE CLAIMS**

Please CANCEL claims 1-15 without prejudice or disclaimer of any of the subject matter claimed therein and ADD new claims in accordance with the following:

16. (New) An apparatus for data acquisition for a control center, comprising:
  - at least one input interface to supply input signals;
  - a transmitting/receiving unit;

a signal processing unit, coupled to said at least one input interface, to perform signal processing of the input signals to derive output data in accordance with a first set of predetermined rules, said signal processing unit including a data analysis unit to record selected input signals at predetermined times in accordance with recording rules defined in advance by the control center for short-term monitoring of information derived from the input signals; and  
an output interface, coupled to said signal processing unit, to supply the output data from said signal processing unit to said transmitting/receiving unit for at least one of automatic transmission and transmission initiated on request.

17. (NEW) The apparatus as claimed in claim 16, further comprising at least one writeable memory to store at least one of an operating system for the apparatus and the recording rules remotely loaded via said transmitting/receiving unit.

18. (NEW) The apparatus as claimed in claim 16, further comprising a data converter, coupled between said at least one input interface and said signal processing unit, to remove distortion from the input signals and to provide a standard data format for the input signals.

19. (NEW) The apparatus as claimed in claim 18, further comprising an address allocation unit, coupled between said at least one input interface and said data converter to convert source-specific addresses of the input signals to an address format of said data converter.

20. (NEW) The apparatus as claimed in claim 16, wherein the apparatus is installed in a mobile vehicle operated by one of a motor and an engine and has a generator of a supply voltage, and

wherein the apparatus further comprises:

a power supply connection coupled to the generator of the supply voltage in the vehicle, said transmitting/receiving unit and said signal processing unit; and

a detection unit, coupled to said power supply connection and to said data analysis unit, to detect at least whether the generator of the supply voltage source is in operation, and to interrupt said data analysis unit when the generator of the supply voltage source is not in operation.

21. (NEW) The apparatus as claimed in claim 20,

further comprising a memory, coupled to the signal processing unit, to store a second set of predetermined rules, and

wherein said signal processing unit further includes a data processing unit to record information data derived from the input signals in accordance with the second set of predetermined rules.

22. (NEW) The apparatus as claimed in claim 21, wherein said memory has a first memory area containing a first subset of the predetermined rules for when the generator of the supply voltage source is in operation, and a second memory area containing a second subset of the predetermined rules for when the generator of the supply voltage source is not in operation.

23. (NEW) The apparatus as claimed in claim 21,  
further comprising a memory to store predetermined alarm rules, and  
wherein said signal processing unit further includes an alarm unit, coupled to said memory and to the data processing unit, to monitor the information data derived from the input signals in accordance with the predetermined alarm rules.

24. (NEW) The apparatus as claimed in claim 23, further comprising an alarm archive to store information on alarms that have occurred.

25. (NEW) The apparatus as claimed in claim 21, wherein the signal processing unit further includes a monitoring unit, coupled to said at least one input interface, to perform direct monitoring of at least one of the input signals and the information data.

26. (NEW) The apparatus as claimed in claim 16, wherein the control center has a control and monitoring system which is also intended for direct control of operating states of a vehicle which is coupled to the apparatus, via control signals.

27. (NEW) The apparatus as claimed in claim 16, further comprising a GPS interface to connect the apparatus to a GPS receiver.

28. (NEW) The apparatus as claimed in claim 16, wherein the input signals are operating data relating to one of a vehicle and a machine.

29. (NEW) The apparatus as claimed in claim 28, wherein the apparatus is integrated in one of a car radio receiver and a car radio receiver/mobile telephone appliance.

30. (NEW) The apparatus as claimed in claim 16, wherein said transmitting/receiving unit transmits the output data to at least one of the control center and a predetermined receiver.

31. (NEW) A method for data acquisition of input signals for a control center, in particular of operating data relating to one of a vehicle and a machine, supplied via at least one input interface, said method comprising:

storing recording rules preset by the control center for short-term monitoring of information derived from the input signals;

recording selected input signals at predetermined times in accordance with the recording rules;

processing the input signals to derive output data in accordance with predetermined rules; and

transmitting, at least one of automatically and on request, the output data to at least one of the control center and a predetermined addressee.

#### REMARKS

This Preliminary Amendment is submitted to improve the form of the English translation as filed. It is respectfully requested that this Preliminary Amendment be entered in the above-referenced application.

In accordance with the foregoing, claims 1-15 have been canceled and claims 16-31 have been added. Thus, claims 16-31 are pending and are under consideration.

A substitute specification is also being filed herewith. The substitute specification is accompanied by a marked-up copy of the original specification.

If there are any questions regarding these matters, such questions can be addressed by telephone to the undersigned. Otherwise, an early action on the merits is respectfully solicited.

If any further fees are required in connection with the filing of this Preliminary Amendment, please charge same to our Deposit Account No. 19-3935.

Respectfully submitted,

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## Description

Apparatus and method for, in particular mobile, data acquisition

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The invention relates to an apparatus for, in particular mobile, data acquisition having at least one input interface for supplying input signals, in particular operating data relating to a vehicle, a machine etc., having a signal processing apparatus, which can be coupled to the input interface, for signal processing of the input signals which are supplied via the input interface.

15 The invention also relates to a method for, in particular mobile, data acquisition of input signals which are supplied via at least one input interface, in particular of operating data relating to a vehicle, a machine etc., in which the input interface is coupled to a signal processing apparatus for signal processing of the input signals which are supplied via the input interface.

25 Such an apparatus is used, for example, in vehicles, for example passenger vehicles, commercial vehicles, construction-industry machines, agricultural machines etc. In this case, systematic operating data acquisition and monitoring of the vehicles is frequently desirable.

30

Such an apparatus is disclosed in GB 2,194,119 A1. The data detection apparatus in this case contains input sensors, which record the status or specific safety or security conditions. Furthermore, a signal processing apparatus is provided, which produces a status report which includes the identity and the location of the data detection apparatus, as well as the respective operating data. The data detection apparatus is

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Variable	Mean	SD	Min	Max
Age (years)	34.5	10.2	18	65
Gender (male/female)	15/15	0	0	30
Marital status (single/married)	10/10	0	0	20
Education (years)	12.5	1.5	8	16
Occupation (student/worker)	10/10	0	0	20
Income (USD/month)	150	50	50	300
Smoking status (yes/no)	5/15	0	0	20
Alcohol consumption (yes/no)	3/17	0	0	20
Family size (members)	3.5	1.0	1	6
Health insurance (yes/no)	18/2	0	0	20
Chronic diseases (yes/no)	2/18	0	0	20
Physical activity (yes/no)	10/10	0	0	20
Stress level (low/high)	12/8	0	0	20
Sleep quality (good/poor)	10/10	0	0	20
Dietary habits (balanced/unbalanced)	10/10	0	0	20
Exercise frequency (times/week)	2.5	1.5	0	6
Work hours (hours/week)	35	5	20	45
Compliance with treatment (yes/no)	15/5	0	0	20
Knowledge of disease (high/low)	10/10	0	0	20
Attitude towards health (positive/negative)	15/5	0	0	20
Support from family (yes/no)	18/2	0	0	20
Access to healthcare (yes/no)	18/2	0	0	20
Healthcare costs (USD/month)	50	20	10	100
Healthcare satisfaction (yes/no)	10/10	0	0	20
Overall health status (good/fair/poor)	10/10/0	0	0	20

[illegible]

The invention is based on the object of specifying an apparatus and a method for, in particular mobile, data acquisition, which allow automated and systematic data acquisition and the passing on of process data, alarm messages etc. in a simple manner.

This object is achieved by an apparatus for, in particular mobile, data acquisition having at least one input interface for supplying input signals, in particular operating data relating to a vehicle, a machine etc., having a signal processing apparatus, which can be coupled to the input interface, for signal processing of the input signals which are supplied via the input interface or interfaces, and for recording data which can be predetermined in the input signals at times which can be predetermined, and having an output interface for supplying output data, which is derived from the input signals in the signal processing apparatus in accordance with rules which can be predetermined, from the signal processing apparatus to a signal conditioning apparatus for conditioning the output data to a transmitting/receiving unit, which can be coupled to the apparatus, for automatic transmission, and/or transmission initiated on request, of the output data to a control center and/or to a predetermined receiver.

This object is achieved by a method for, in particular mobile, data acquisition of input signals which are supplied via at least one input interface, in particular of operating data relating to a vehicle, a machine etc., in which the input interface is coupled to a signal processing apparatus for signal processing of the input signals which are supplied via the input interface, in which data which can be predetermined in the input signals are recorded by the signal processing apparatus at times which can be predetermined, and output data is derived from the input signals in the

signal processing apparatus in accordance with rules which can be predetermined, which output data is passed on automatically to a transmitting/receiving unit which can be coupled to the signal processing apparatus

[illegible]

and/or on request to a control center and/or to a predetermined addressee.

5 The invention is based on the knowledge that use of a mobile data acquisition apparatus, in particular in the field of complex construction-industry machines, construction-industry vehicles and commercial vehicles etc., allows systematic data acquisition which leads, overall, to better availability of the respective  
10 vehicles etc. To achieve this, the data acquisition apparatus is supplied via the input interface with the respective input signals required for evaluation and diagnosis. This input data in the input signals is evaluated in the signal processing apparatus in the  
15 data acquisition apparatus, either during operation of the respective vehicle or else when the vehicle is stationary, in accordance with previously defined rules which are stored in the signal processing apparatus, and is passed on either automatically or on request,  
20 for example from a control center, via the transmitting/receiving unit to a specific addressee or to the control center. The control center, which is responsible, for example, for a specific fleet of vehicles, in this way has a comprehensive overview of  
25 the respective machine states and of the measured values from the vehicles so that, for example, it is possible to identify technical defects at an early stage, relating to the operational reliability or safety and availability of the respective vehicle.  
30 Furthermore, this also allows the respective servicing intervals to be optimized on a vehicle-specific basis. The rules required for evaluation of the respective input data are stored in the signal processing apparatus and can in each case be individually matched  
35 to the respective vehicle etc. and to the respective specific operating conditions.

One simple and cost-effective option for configuration of the data acquisition apparatus can be achieved by the apparatus having at least one

Parameter	Unit	Value	Standard Error	t-Statistic	p-Value
Intercept		1.0000	0.0000	1.0000	0.0000
Age	Years	0.0000	0.0000	0.0000	0.0000
Age squared	Years squared	0.0000	0.0000	0.0000	0.0000
Age cubed	Years cubed	0.0000	0.0000	0.0000	0.0000
Age quartic	Years quartic	0.0000	0.0000	0.0000	0.0000
Age quintic	Years quintic	0.0000	0.0000	0.0000	0.0000
Age sextic	Years sextic	0.0000	0.0000	0.0000	0.0000
Age septic	Years septic	0.0000	0.0000	0.0000	0.0000
Age octic	Years octic	0.0000	0.0000	0.0000	0.0000
Age nonic	Years nonic	0.0000	0.0000	0.0000	0.0000
Age decic	Years decic	0.0000	0.0000	0.0000	0.0000
Age undecic	Years undecic	0.0000	0.0000	0.0000	0.0000
Age duodecic	Years duodecic	0.0000	0.0000	0.0000	0.0000
Age tredecic	Years tredecic	0.0000	0.0000	0.0000	0.0000
Age quattuordecic	Years quattuordecic	0.0000	0.0000	0.0000	0.0000
Age quindecic	Years quindecic	0.0000	0.0000	0.0000	0.0000
Age sexdecic	Years sexdecic	0.0000	0.0000	0.0000	0.0000
Age septendecic	Years septendecic	0.0000	0.0000	0.0000	0.0000
Age octodecic	Years octodecic	0.0000	0.0000	0.0000	0.0000
Age novemdecic	Years novemdecic	0.0000	0.0000	0.0000	0.0000
Age vigintic	Years vigintic	0.0000	0.0000	0.0000	0.0000
Age unvigintic	Years unvigintic	0.0000	0.0000	0.0000	0.0000
Age bivigintic	Years bivigintic	0.0000	0.0000	0.0000	0.0000
Age trivigintic	Years trivigintic	0.0000	0.0000	0.0000	0.0000
Age quadravigintic	Years quadravigintic	0.0000	0.0000	0.0000	0.0000
Age quinquavigintic	Years quinquavigintic	0.0000	0.0000	0.0000	0.0000
Age sexavigintic	Years sexavigintic	0.0000	0.0000	0.0000	0.0000
Age septuavigintic	Years septuavigintic	0.0000	0.0000	0.0000	0.0000
Age octuavigintic	Years octuavigintic	0.0000	0.0000	0.0000	0.0000
Age nonuavigintic	Years nonuavigintic	0.0000	0.0000	0.0000	0.0000
Age decuavigintic	Years decuavigintic	0.0000	0.0000	0.0000	0.0000
Age undecuavigintic	Years undecuavigintic	0.0000	0.0000	0.0000	0.0000
Age duodecuavigintic	Years duodecuavigintic	0.0000	0.0000	0.0000	0.0000
Age tredecuavigintic	Years tredecuavigintic	0.0000	0.0000	0.0000	0.0000
Age quattuordecuavigintic	Years quattuordecuavigintic	0.0000	0.0000	0.0000	0.0000
Age quindecuavigintic	Years quindecuavigintic	0.0000	0.0000	0.0000	0.0000
Age sexdecuavigintic	Years sexdecuavigintic	0.0000	0.0000	0.0000	0.0000
Age septendecuavigintic	Years septendecuavigintic	0.0000	0.0000	0.0000	0.0000
Age octodecuavigintic	Years octodecuavigintic	0.0000	0.0000	0.0000	0.0000
Age novemdecuavigintic	Years novemdecuavigintic	0.0000	0.0000	0.0000	0.0000
Age viginticuavigintic	Years viginticuavigintic	0.0000	0.0000	0.0000	0.0000
Age unviginticuavigintic	Years unviginticuavigintic	0.0000	0.0000	0.0000	0.0000
Age biviginticuavigintic	Years biviginticuavigintic	0.0000	0.0000	0.0000	0.0000
Age triviginticuavigintic	Years triviginticuavigintic	0.0000	0.0000	0.0000	0.0000
Age quadraviginticuavigintic	Years quadraviginticuavigintic	0.0000	0.0000	0.0000	0.0000
Age quinquaviginticuavigintic	Years quinquaviginticuavigintic	0.0000	0.0000	0.0000	0.0000
Age sexaviginticuavigintic	Years sexaviginticuavigintic	0.0000	0.0000	0.0000	0.0000
Age septuaviginticuavigintic	Years septuaviginticuavigintic	0.0000	0.0000	0.0000	0.0000
Age octuaviginticuavigintic	Years octuaviginticuavigintic	0.0000	0.0000	0.0000	0.0000
Age nonuaviginticuavigintic	Years nonuaviginticuavigintic	0.0000	0.0000	0.0000	0.0000
Age decuaviginticuavigintic	Years decuaviginticuavigintic	0.0000	0.0000	0.0000	0.0000
Age undecuaviginticuavigintic	Years undecuaviginticuavigintic</				

memory which can be written to, for storage of an operating system for the apparatus and/or of the rules which can be predetermined, in which case the memory data intended for that memory can be loaded remotely  
5 via the transmitting/receiving unit.

Effective data processing by the signal processing apparatus can be achieved independently of the respective data format of the input signals by the  
10 apparatus having a data converter, which is arranged between the input interface and the signal processing apparatus and is used to remove distortion from the supplied input signals and to provide a standard data format for the input signals which are supplied via the  
15 input interface or interfaces.

The input data can be additionally conditioned with regard to the specific addresses by the apparatus having an address allocation unit, which is provided  
20 between the data converter and the input interface or interfaces, and is intended for conversion of the source-specific addresses in the input signals to the address format of the data converter.

25 Data recording and analysis can be made possible, in a similar way to an oscilloscope, by the signal processing apparatus having a data analysis unit, which is intended for recording of selected input signals at times which can be predetermined, with the recording  
30 rules being defined in advance by the control center from the short-term monitoring of information which can be derived from the input signals. An energy-saving mode for the apparatus, which is of major importance during mobile use, can be achieved by the apparatus  
35 being installed in a mobile vehicle that is powered by a motor or engine, and has a connecting apparatus for connection to the supply voltage in the vehicle, by

the apparatus having means for detection of at least one "Generator of the supply voltage source in operation" first operating mode and of at least one "Generator of the supply voltage source not in operation" second operating

mode, with the work of the data analysis unit being interrupted in the second operating mode. Alarm monitoring and long-term data acquisition can continue to run in this case.

5

User-friendly monitoring and objective diagnosis based on the input signals which can be processed by the mobile data acquisition apparatus can be carried out, in particular for long-term evaluation purposes, by the  
10 signal processing apparatus having a data processing unit for recording information data which can be derived from the input signals in accordance with rules which can be predetermined, and by the apparatus having a first memory for storage of the rules for the data  
15 processing unit.

The power management of the data acquisition apparatus is further improved by the first memory having two memory areas, with a first memory area containing the  
20 rules for the "Generator of the supply voltage source in operation" operating mode, and a second memory area containing the rules for the "Generator of the supply voltage source not in operation" operating mode.

25 An alarm function can be produced for the data acquisition apparatus by the signal processing apparatus having an alarm unit for monitoring information data which can be derived from the input signals in accordance with alarm rules which can be  
30 predetermined, and by the apparatus having a second memory for storage of the rules for the alarm unit.

The respective alarms produced can be monitored, for example for statistical evaluation purposes, by the  
35 apparatus having an alarm archive for entering alarms that have occurred.

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The input signals which are gathered in the data acquisition apparatus and can also be checked via an on-line link,

	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378	2379	2380	2381	2382	2383	2384	2385	2386	2387	2388	2389	2390	2391	2392	2393	2394	2395	2396	2397	2398	2399	2400	2401	2402	2403	2404	2405	2406	2407	2408	2409	2410	2411	2412	2413	2414	2415	2416	2417	2418	2419	2420	2421	2422	2423	2424	2425	2426	2427	2428	2429	2430	2431	2432	2433	2434	2435	2436	2437	2438	2439	2440	2441	2442	2
--	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	---

together with the information which can be derived from these signals, is monitored by the signal processing apparatus having a monitoring unit for direct monitoring of input signals and/or of information data  
5 which can be derived from the input signals.

An additional action for control and monitoring purposes is provided by the monitoring unit, as the control and monitoring unit, also having control  
10 signals, which can be fed in via the input/output interface or interfaces for direct control of operating modes of a vehicle which is coupled to the apparatus.

The options for use of the data acquisition apparatus, as well as the conditioning of the input data, can be  
15 further enlarged or extended by the apparatus having the capability to be coupled to a GPS receiver.

One data acquisition implementation, which also  
20 involves multiple use of components, can be provided particularly advantageously and in a particularly cost-saving manner by the apparatus being integrated in, and hence coupled to, a car radio receiver and/or a car radio receiver/mobile telephone appliance combination.

25

The invention will be described and explained in more detail in the following text with reference to the exemplary embodiments which are illustrated in the figures, in which:

30

Figure 1 shows a block diagram of an exemplary embodiment of an overall system for mobile data acquisition,

35 Figure 2 shows an illustration of the outline structure of the data acquisition apparatus,

Figure 4 shows an overview of an example of  
5 configuration data for a data acquisition  
apparatus, and

10

Parameter	Unit	Value
Mean	mm	1.2
Standard deviation	mm	0.5
Minimum	mm	0.5
Maximum	mm	2.0
Range	mm	1.5
Median	mm	1.0
Mode	mm	1.0
Skewness		0.5
Kurtosis		0.5
Correlation coefficient		0.5
Regression equation		$y = 0.5x + 0.5$
Intercept		0.5
Slope		0.5
Adjusted R-squared		0.5
F-statistic		0.5
P-value		0.5
Confidence interval		0.5
Standard error		0.5
Mean square		0.5
Sum of squares		0.5
Total		0.5
Error		0.5
Regression		0.5
Adjusted		0.5
Sum of squares		0.5
Mean square		0.5
F-statistic		0.5
P-value		0.5
Confidence interval		0.5
Standard error		0.5
Mean square		0.5
Sum of squares		0.5
Total		0.5
Error		0.5
Regression		0.5
Adjusted		0.5
Sum of squares		0.5
Mean square		0.5
F-statistic		0.5
P-value		0.5
Confidence interval		0.5
Standard error		0.5
Mean square		0.5
Sum of squares		0.5
Total		0.5
Error		0.5
Regression		0.5
Adjusted		0.5
Sum of squares		0.5
Mean square		0.5
F-statistic		0.5
P-value		0.5
Confidence interval		0.5
Standard error		0.5
Mean square		0.5
Sum of squares		0.5
Total		0.5
Error		0.5
Regression		0.5
Adjusted		0.5
Sum of squares		0.5
Mean square		0.5
F-statistic		0.5
P-value		0.5
Confidence interval		0.5
Standard error		0.5
Mean square		0.5
Sum of squares		0.5
Total		0.5
Error		0.5
Regression		0.5
Adjusted		0.5
Sum of squares		0.5
Mean square		0.5
F-statistic		0.5
P-value		0.5
Confidence interval		0.5
Standard error		0.5
Mean square		0.5
Sum of squares		0.5
Total		0.5
Error		0.5
Regression		0.5
Adjusted		0.5
Sum of squares		0.5
Mean square		0.5
F-statistic		0.5
P-value		0.5
Confidence interval		0.5
Standard error		0.5
Mean square		0.5
Sum of squares		0.5
Total		0.5
Error		0.5
Regression		0.5
Adjusted		0.5
Sum of squares		0.5
Mean square		0.5
F-statistic		0.5
P-value		0.5
Confidence interval		0.5
Standard error		0.5
Mean square		0.5
Sum of squares		0.5
Total		0.5
Error		0.5
Regression		0.5
Adjusted		0.5
Sum of squares		0.5
Mean square		0.5
F-statistic		0.5
P-value		0.5
Confidence interval		0.5
Standard error		0.5
Mean square		0.5
Sum of squares		0.5
Total		0.5
Error		0.5
Regression		0.5
Adjusted		0.5
Sum of squares		0.5
Mean square		0.5
F-statistic		0.5
P-value		0.5
Confidence interval		0.5
Standard error		0.5
Mean square		0.5
Sum of squares		0.5
Total		0.5
Error		0.5
Regression		0.5
Adjusted		0.5
Sum of squares		0.5
Mean square		0.5
F-statistic		0.5
P-value		0.5
Confidence interval		0.5
Standard error		0.5
Mean square		0.5
Sum of squares		0.5
Total		

transmitting/receiving unit 5, for example a GSM module (GSM = **G**lobal **S**ystem for **M**obile Communication). The GSM module 5 is connected to a transmitting/receiving antenna 6. The

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vehicle F1 can set up a bidirectional data link via a radio interface 9 between the antenna 6 of the data acquisition apparatus MC and an antenna 11 of a base station 10a..10n. The base stations 10a..10n in a GSM mobile radio network N are connected to a network operator 13 for the mobile radio network N. There is a link 14 from the operator 13 of the mobile radio network N to a control center 15. A further data link is possible, alternatively or in addition, as a mobile data link 16 via a further base station 17 between a receiver E and the operator 13, as a mobile data link 12. A computer 20 having a data processing apparatus 22, a monitor 21 and a keyboard or keypad 23 is used, for example, as the man-machine interface for communication between the control center 15 and the data acquisition apparatus MC.

Figure 1 shows how the data acquisition apparatus MC is embedded within a system for monitoring and diagnosis of vehicles F1..Fn. Instead of the vehicles F1..Fn illustrated in Figure 1, other, both mobile and stationary, vehicles and machines, such as construction-industry vehicles, cranes, containers, tracked vehicles etc., can also be included within such a system. As will be explained in even more detail below with reference to Figure 3, the data acquisition apparatus MC records specific input signals I1..I4 over a relatively long time period. Thus, for example, signals which relate to the operational safety or reliability of the vehicle F1..Fn, such as the water temperature, oil temperature, refrigeration temperature of a refrigerated vehicle etc., can be recorded at specific times in accordance with the rules stored in the data acquisition apparatus MC. The signals recorded in this way can then be transmitted via the output interface, either on request by the control center 15 or on request by any other receiver E, via the output

interface SA and the radio transmitting/receiving unit  
5 connected to it, to the control center 15 and/or to  
the receiver E. This allows effective fault diagnosis,  
for example in the event of a defect in the vehicle  
5 Fl..Fn. Furthermore, it is possible

likewise to record specific input signals I1..I4 in the data acquisition apparatus MC over a short time period, for example being started and stopped by trigger events, and hence to obtain highly up-to-date machine/vehicle states on the basis of a very up-to-date display, and to initiate appropriate maintenance and/or repair measures etc. Signals can also be recorded over a short time period, for example, in the form of a direct dialogue link between the control center 15 and the data acquisition apparatus MC, via an on-line link in the form of the air interface 9. The rules in the data acquisition apparatus MC can be constructed such that an alarm signal can also be produced automatically when specific defect events occur, for example when limit values are exceeded. Furthermore, the data acquisition apparatus MC can transmit location data to the control center, based on the location data supplied via the GPS data source Q4. Firstly, this provides theft monitoring and, secondly, it allows a vehicle fleet F1..Fn to be managed with a clear overview of the vehicles to be covered by the control center 15. Furthermore, a voice link is also possible, when required, between the driver of the vehicle F1 and the control center 15 via the radio link 9 between the control center 15 and the vehicle F1, without any separate radio transmitting/receiving apparatus being required for this purpose. Furthermore, for example in the event of a fault, a notebook etc., for example, can also be connected on site via the interface S2, thus allowing the recorded signals to be evaluated on site for fault tracing. The information transmitted from the data acquisition apparatus MC to the control center 15 can be displayed in an optimum manner by installing in the computer device 22 a software packet which is based, for example, on the Siemens WinCC control and monitoring system, or on operating systems such as Windows. This also optimizes





F1..Fn, for example traffic radio, data and/or order data etc., can be transmitted from the control center on a vehicle-specific or fleet-specific basis. The rules in the data acquisition apparatus MC for acquisition and transmission of input signal data Ia..4a to the control center are stored in the data acquisition apparatus MC such that the rules can be loaded remotely from the control center 15 in the data acquisition apparatus MC via the air interface 9.

10

Figure 2 shows an overview of the outline structure of a data acquisition apparatus, in which case this structure will also be explained in more detail with reference to the more detailed outline illustration in Figure 3.

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Figure 2 shows an outline illustration relating to the data acquisition and data processing in a data acquisition apparatus MC. The data acquisition apparatus MC has input interfaces S1..S4, as has already been explained in principle with reference to Figure 1. The first interface S1 is, for example, in the form of a CAN interface (CAN = **C**ontroller **A**rea **N**etwork). In the exemplary embodiment illustrated in Figure 3, the second interface S2 is in the form of a serial interface, for example for connection of a keyboard or keypad, while the third interface S3 is in the form of an on-board input/output interface, for example for connection of sensors, encoders etc. The fourth interface S4 is used for connection of the data from a GPS module (GPS = **G**lobal **P**ositioning **S**ystem). The input signals I1..I4 supplied via the interfaces S1..S4 are passed on via an address allocation unit AZ and a data converter EA to a signal processing apparatus 1. The signal processing apparatus 1 has an output interface SA, via which output signals 18 are passed on to a communication driver KT, for example a

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GSM driver. The signal processing apparatus 16 contains means A, L, D, M for recording and

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monitoring input signals I1..I4, which can be predetermined, at times which can be predetermined. In detail, the means L, A, D, M comprise a data analysis unit D, which is intended for recording selected input  
5 signals I1..I4 at times which can be predetermined, with the recording rules for short-term monitoring of information which can be derived from the input signals 1a..4a being defined in advance from the control center. The corresponding rules are stored in a data  
10 analysis rule interpreter DR. The rules which are stored in the memory DR can be loaded remotely via the output interface SA, via a link D1. The data signals d determined by means of the data analysis unit D are recorded by means of the recording apparatus DA and a  
15 data buffer DP. The data processing unit L is constructed in a similar way. The data processing unit L also contains a memory LR for storage of the rules for recording the input signals 1 to be processed by means of the data processing unit L. A preprocessing  
20 unit LV, a data recording unit LA and a data buffer LP are also provided. Further processing units in the signal processing apparatus 16 are the alarm unit A for monitoring information data which can be derived from the input signals 1a..4a in accordance with alarm rules  
25 which can be predetermined. The alarm unit A comprises a memory AR for storage of the alarm monitoring rules. The alarms are monitored by evaluation of the alarm signals a supplied to the alarm unit, which are passed on to an alarm monitoring unit AÜ and an alarm archive  
30 AA.

The method of operation of the mobile data acquisition apparatus illustrated in Figure 2 will be explained in more detail in the following text with reference to the  
35 respective function blocks. The address allocation unit AZ is formed from address allocation tables, which carry out the conversion process between source-



on the basis of the source and on the basis of the supplied input signals I1..I4, and are thus also different. However, the definition of the format (bit, byte, word...), address in the respective input/output map of the data converter EA, bit offset for bit types and, if necessary, the length, are common to them. In order to save addressing space, the data converter EA is separated into data format areas in which the data received via the different sources is entered as an input map. The data converter EA has the tasks of removing distortion between the asynchronous delivery of the data by the sources, and evaluation by means of the downstream signal processing apparatus 1. A further task is for the data converter EA to provide the data using a standard interface, irrespective of the source, and with a standard data format. The central element for long-term data acquisition and data monitoring is formed by the data analysis unit D, which is also referred to as the data analyzer in the following text. The data analysis unit D operates in a similar way to an oscilloscope, that is to say individual selected signals are recorded at defined times. The recording process can in each case be started or stopped by means of the recording rules DR. In contrast to the data processing unit L, the data analysis unit D is used for short-term monitoring of events as they occur. The corresponding rules DR for this short-term monitoring are thus chosen such that the recording of the data signals by means of the recording unit DA takes place only in a "Generator of the supply voltage source in the vehicle in operation" operating mode, or only in an "ignition ON" operating mode. This ensures that the battery voltage of the vehicle in which the data acquisition apparatus MC is arranged is not loaded unnecessarily. It can be seen from the data link D1 that the rules in the data analysis unit D are transferred from a control center to the data acquisition apparatus MC for the running time. By way of example,

Figure 5 shows an example of a mask for setting the recording rules for the data analysis unit D.

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The functionality of the data processing unit L corresponds essentially to the functionality of the data analysis unit D. In contrast to the data analysis unit D, the data processing unit L is used for recording data over a relatively long time period in accordance with the predetermined rules LR. Such rules may be, for example: averaging, maximum-value formation, minimum-value formation. The rules LR can be stored by a control center in an appropriate parameter/configuration area. There are also two rule areas in the case of the data processing unit L, namely one rule area for the normal operating mode, and one for what is referred to as the power-safe operating mode. The power-safe operating mode describes the "Generator of the supply voltage source not in operation" operating mode, which generally corresponds to the engine/motor OFF operating mode. The data preprocessing unit LV is used for preprocessing (integration, minimum/maximum-value formation) of the events sampled in the appropriate recording time frame.

The alarm signaling system A essentially has two parts: the alarm archive AA and the alarm monitoring AÜ. The alarm signaling system A monitors signals from the input map of the data converter EA and produces alarm messages. The alarm monitoring AÜ checks the input map, controlled with respect to time and in accordance with the alarm monitoring rules AR, for events that need to be reported. If an alarm situation is identified in this case, then an appropriate alarm message is entered in the alarm archive AA. The alarm monitoring rules AR in this case define when an alarm must be identified as incoming or outgoing. An alarm message may, for example, be passed on via the GSM driver and a radio transmitting unit coupled to it as an SMS message (SMS = **Short Message Service**) to the control center or to a predetermined receiver (see Figure 1). The alarm

signaling system is also used to monitor the acknowledgement of the alarms that occur.



A further element of the signal processing apparatus 16 is the data monitoring unit M, which allows on-line monitoring of values via a control center.

5 The output interface SA is in the form of a data request interface, and forms a neutral interface between the functionalities of the data acquisition apparatus MC and the communication driver for the operating station, for example for the corresponding  
10 control and monitoring system in a control center. The communication driver AT manages the downstream communication medium, for example a control and monitoring system WinCC, and converts the address messages, which are specific to the respective control  
15 and monitoring system, to the output interface SA.

Figure 4 shows an overview of an example of configuration data for a data acquisition apparatus. The configuration database DB contains the  
20 configuration data required for the overall system. This database is used to generate the databases DB1, DB2,... required for the individual components. The first database DB1 contains the configuration data required for the data acquisition unit. The databases  
25 Q1..Qn in the data sources control the behavior of the behavior of the data sources. The alarm system A defines the rules for alarm monitoring. The databases LR1, LR2 define the recording rules for the data processing unit L (see Figure 3). Furthermore, a  
30 [lacuna] can be provided for the database, which is not illustrated in Figure 4, for a classification unit K, defining the classification rules for a classification unit K. The task of the classification unit K is to assess a signal over a relatively long time period. The  
35 signal status is allocated to configurable classes. For example, one signal may be subdivided into 10 classes. If, for example, the signal value range is from 0 to 999 and 10 classes of equal size are configured, each

class contains a value range of 100. The first class represents the

100 200 300 400 500

range from 0 to 99, the second the range from 100 to 199, etc. The result is then: signal for 140 s in class 1, for 20 s in class 2 etc. The second database DB2, which is managed in the control center, relates to the alarm archive AA and symbol management [lacuna] used for the symbol management required in conjunction with the data analysis unit D, the data processing unit L, the classification unit K and the data monitoring unit M.

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The configuration database DB can be produced in a simple manner, for example in the form of Excel tables, or using a graphical configuration tool. At least certain parts of the configuration database DB may contain data that can be loaded retrospectively from the control center and can thus be matched to new monitoring models etc.

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Figure 5 shows an example of an input mask for producing rules for a data analysis unit. The input mask M contains a first input field EF1 for presetting the respective input signals to be recorded, and a second input field EF2 for presetting the respective recording rules. The respective signals to be recorded (oil pressure, engine speed, water temperature) are defined in the first input field EF1, together with the time frame for the recording of the signals. The second input field EF2 is used to preset the respective recording rules, for example the engine speed must be recorded when the value is greater than 50.

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In summary, the invention thus relates to an apparatus MC and a method for, in particular mobile, data acquisition having at least one input interface S1..S4 for supplying input signals I1..I4, in particular data relating to a vehicle F1..Fn, a machine etc., having a signal processing apparatus 16, which can be coupled to the input interface S1..S4, for signal processing of

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the data supplied via the input interface S1..S4, and  
having an

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output interface SA for supplying output data 17 from the signal processing apparatus 16 to a transmission apparatus 5 for transmitting the output data 17 to a control center 15. Automated and systematic data acquisition for process data acquisition, alarm signaling etc. can thus be achieved in a simple manner by the signal processing apparatus 16 having means A, L, D for recording and assessment of input data I1..I4, which can be predetermined, at times which can be predetermined.

## Patent Claims

1. An apparatus (MC) for, in particular mobile, data acquisition having at least one input interface  
5 (S1..S4) for supplying input signals (I1..I4), in particular operating data relating to a vehicle (F1..Fn), a machine etc., having a signal processing apparatus (1), which can be coupled to the input  
10 interface (S1..Sn), for signal processing of the input signals (I1..I4) which are supplied via the input interface or interfaces (S1..S4), and for recording data which can be predetermined in the input signals (I1..I4) at times which can be predetermined, and  
15 having an output interface (SA) for supplying output data (17), which is derived from the input signals (I1..I4) in the signal processing apparatus (1) in accordance with rules (LR, AR, DR) which can be predetermined, from the signal processing apparatus (1) to a transmitting/receiving unit (5) for automatic  
20 transmission, and/or transmission initiated on request, of the output data (18) to a control center (15) and/or to a predetermined receiver (E).

2. The apparatus as claimed in claim 1,  
25 characterized  
in that the apparatus (MC) has at least one memory (AR, DR, LR) which can be written to, for storage of an operating system for the apparatus (MC) and/or the rules (LR, AR, DR) which can be predetermined, in which  
30 case this memory (AR, DR, LR) can be remotely loaded via the transmitting/receiving unit (5).

3. The apparatus as claimed in one of claims 1 or 2,  
characterized  
35 in that the apparatus (MC) has a data converter (EA), which is arranged between the input interface (S1, S2, S3, S4) and the signal processing device (1) and which

is used for removing distortion from the supplied input signals (I1..I4) and for providing a standard data format for the input signals (I1..I4) which are supplied via the input interface or interfaces

5 (S1..S4).

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 47 48 49 50 51 52 53 54 55 56 57 58 59 60 61 62 63 64 65 66 67 68 69 70 71 72 73 74 75 76 77 78 79 80 81 82 83 84 85 86 87 88 89 90 91 92 93 94 95 96 97 98 99 100 101 102 103 104 105 106 107 108 109 110 111 112 113 114 115 116 117 118 119 120 121 122 123 124 125 126 127 128 129 130 131 132 133 134 135 136 137 138 139 140 141 142 143 144 145 146 147 148 149 150 151 152 153 154 155 156 157 158 159 160 161 162 163 164 165 166 167 168 169 170 171 172 173 174 175 176 177 178 179 180 181 182 183 184 185 186 187 188 189 190 191 192 193 194 195 196 197 198 199 200 201 202 203 204 205 206 207 208 209 210 211 212 213 214 215 216 217 218 219 220 221 222 223 224 225 226 227 228 229 230 231 232 233 234 235 236 237 238 239 240 241 242 243 244 245 246 247 248 249 250 251 252 253 254 255 256 257 258 259 260 261 262 263 264 265 266 267 268 269 270 271 272 273 274 275 276 277 278 279 280 281 282 283 284 285 286 287 288 289 290 291 292 293 294 295 296 297 298 299 300 301 302 303 304 305 306 307 308 309 310 311 312 313 314 315 316 317 318 319 320 321 322 323 324 325 326 327 328 329 330 331 332 333 334 335 336 337 338 339 340 341 342 343 344 345 346 347 348 349 350 351 352 353 354 355 356 357 358 359 360 361 362 363 364 365 366 367 368 369 370 371 372 373 374 375 376 377 378 379 380 381 382 383 384 385 386 387 388 389 390 391 392 393 394 395 396 397 398 399 400 401 402 403 404 405 406 407 408 409 410 411 412 413 414 415 416 417 418 419 420 421 422 423 424 425 426 427 428 429 430 431 432 433 434 435 436 437 438 439 440 441 442 443 444 445 446 447 448 449 450 451 452 453 454 455 456 457 458 459 460 461 462 463 464 465 466 467 468 469 470 471 472 473 474 475 476 477 478 479 480 481 482 483 484 485 486 487 488 489 490 491 492 493 494 495 496 497 498 499 500 501 502 503 504 505 506 507 508 509 510 511 512 513 514 515 516 517 518 519 520 521 522 523 524 525 526 527 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4. The apparatus as claimed in one of claims 1 to 3, characterized

in that the apparatus (MC) has an address allocation unit (AZ), which is provided between the data converter (EA) and the input interface or interfaces (S1..S4), and is intended for conversion of the source-specific addresses of the input signals (I1..I4) to the address format of the data converter (EA).

10 5. The apparatus as claimed in one of claims 1 to 4, characterized

in that the signal processing apparatus (16) has a data analysis unit (D), which is intended for recording selected input signals (I1..I4) at times which can be predetermined, in which case the recording rules are predetermined starting from the control center (15) for short-term monitoring of information which can be derived from the input signals.

20 6. The apparatus as claimed in one of claims 1 to 5, characterized

in that the apparatus (MC) is installed in a mobile vehicle (F1..Fn) which is operated by a motor or engine (3), and has a connecting apparatus for connection to the supply voltage in the vehicle (F1..Fn), in that the apparatus (MC) has means for detection of at least one first "Generator of the supply voltage source (B) in operation" first operating mode and of at least one "Generator of the supply voltage source not in operation" second operating mode, with the work of the data analysis unit (D) being interrupted in the second operating mode.

35 7. The apparatus as claimed in one of claims 1 to 6, characterized

in that the signal processing apparatus (16) has a data processing unit (L) for recording information data

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[illegible]

9. The apparatus as claimed in one of claims 1 to 8,  
characterized  
15 in that the signal processing apparatus (16) has an  
alarm unit (A) for monitoring information data which  
can be derived from the input signals (I1..I4) in  
accordance with alarm rules which can be predetermined,  
and in that the apparatus (MC) has a second memory (AR)  
20 for storage of the rules for the alarm unit (A).

11. The apparatus as claimed in one of claims 1 to 10,  
characterized  
in that the signal processing apparatus (1) [lacuna] a  
30 monitoring unit (DM) for direct monitoring of input  
signals (1a..4a) and/or of information data which can  
be derived from the input signals (I1..I4).

12. The apparatus as claimed in one of claims 1 to 11,  
35 characterized  
in that the control center has a control and  
monitoring system which is also intended for direct  
control of operating modes of a

vehicle (F1..Fn) which is coupled to the apparatus, via control signals (I1..I4).

13. The apparatus as claimed in one of claims 1 to 12,  
5 characterized  
in that the apparatus (MC) can be coupled to a GPS receiver.

14. The apparatus as claimed in one of claims 1 to 13,  
10 characterized  
in that the apparatus (MC) is integrated in a car radio receiver and/or in a car radio receiver/mobile telephone appliance combination.

15 15. A method for, in particular mobile, data acquisition of input signals (I1..I4) which are supplied via at least one input interface (S1..Sn), in particular of operating data relating to a vehicle (F1..Fn), a machine etc., in which the input interface  
20 (S1..Sn) is coupled to a signal processing apparatus (1) for signal processing of the input signals (S1..S4) which are supplied via the input interface (S1..S4), in which data which can be predetermined in the input signals (S1..S4) are recorded by the signal processing  
25 apparatus (1) at times which can be predetermined, and output data (18) is derived from the input signals (S1..S4) in the signal processing apparatus (1) in accordance with rules which can be predetermined, which output data (18) is passed on automatically to a  
30 transmitting/receiving unit (5) and/or on request to a control center (15) and/or to a predetermined addressee (E).



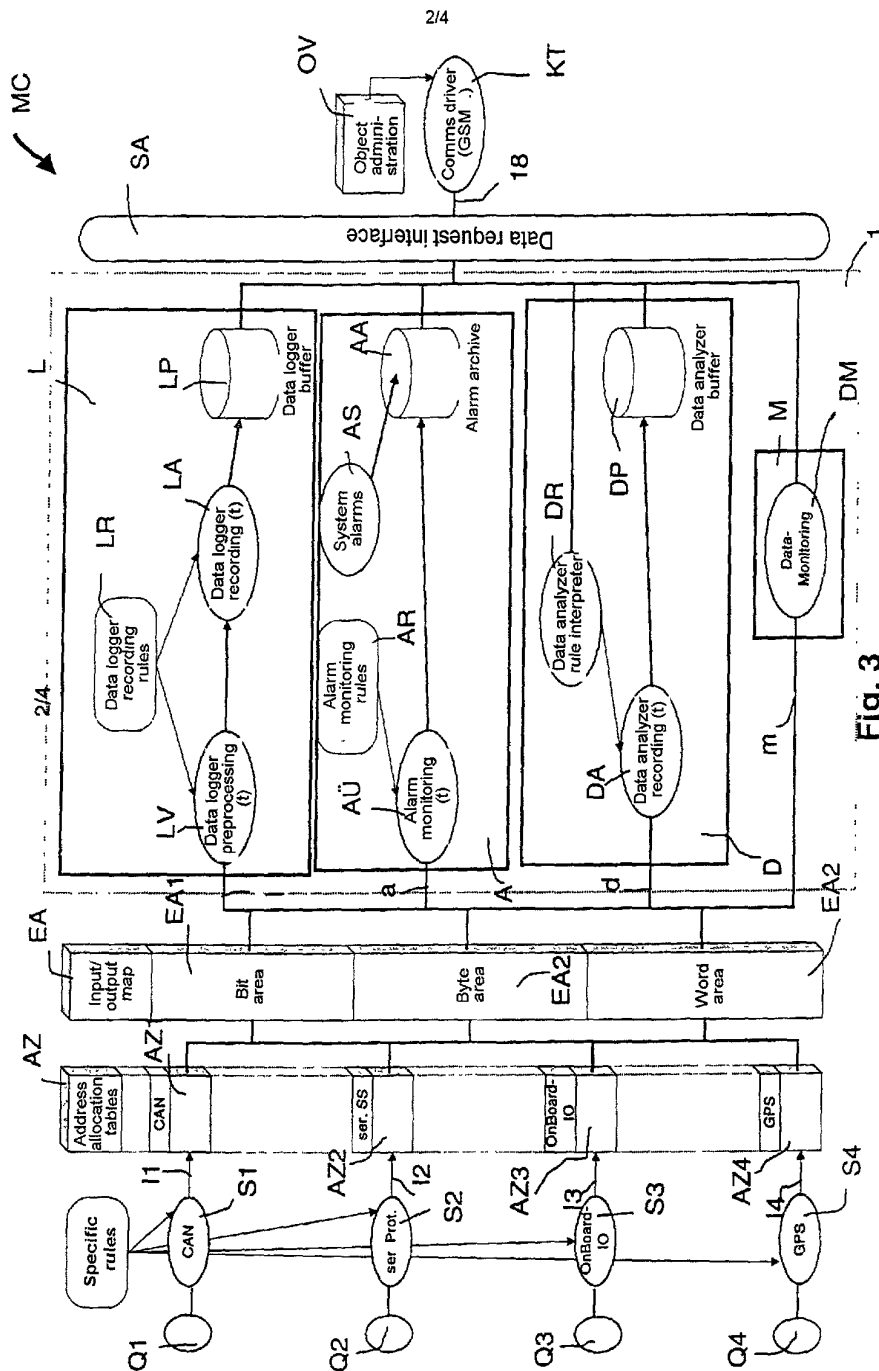


Fig. 3

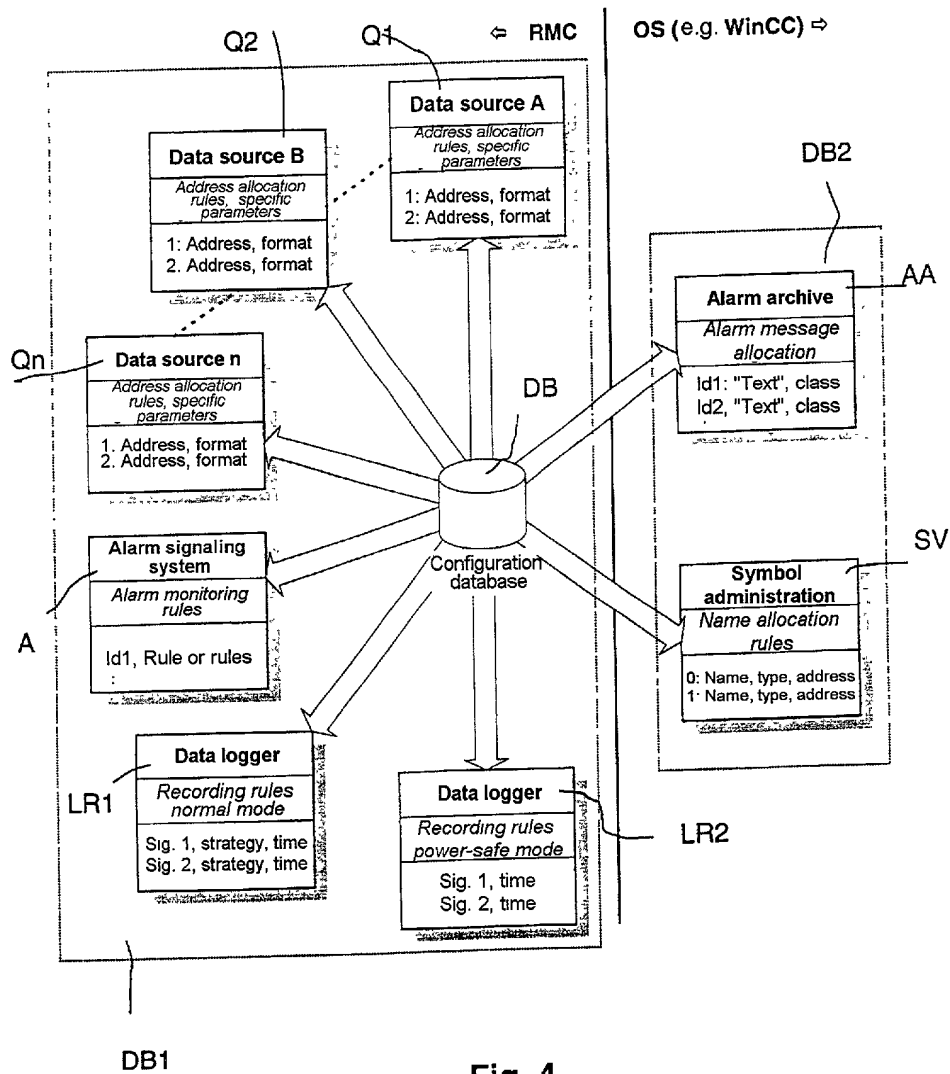


Fig. 4

09/937708

EF1

EF2

**Recording**

Signal	Time [10 ms]
Oil pressure ▼	10
Engine speed ▼	1
Water temperature ▼	100

Activate

Terminate

**Trigger**

Signal	Condition	Value	Logic operation
Engine speed ▼	>	50	OR ▼
Oil pressure ▼	>	30	▼
▼	▼		

Position: POST ▼

Fig. 5

**Declaration and Power of Attorney For Patent Application****Erklärung Für Patentanmeldungen Mit Vollmacht****German Language Declaration**

Als nachstehend benannter Erfinder erkläre ich hiermit an Eides Statt:

dass mein Wohnsitz, meine Postanschrift, und meine Staatsangehörigkeit den im Nachstehenden nach meinem Namen aufgeführten Angaben entsprechen,

dass ich, nach bestem Wissen der ursprüngliche, erste und alleinige Erfinder (falls nachstehend nur ein Name angegeben ist) oder ein ursprünglicher, erster und Miterfinder (falls nachstehend mehrere Namen aufgeführt sind) des Gegenstandes bin, für den dieser Antrag gestellt wird und für den ein Patent beantragt wird für die Erfindung mit dem Titel:

Vorrichtung und Verfahren zur insbesondere mobilen Datenerfassung

deren Beschreibung

(zutreffendes ankreuzen)

☐ hier beigefügt ist.

☒ am 20.03.2000 als

PCT internationale Anmeldung

PCT Anmeldungsnummer PCT/DE00/00863

eingereicht wurde und am \_\_\_\_\_ abgeändert wurde (falls tatsächlich abgeändert).

Ich bestätige hiermit, dass ich den Inhalt der obigen Patentanmeldung einschliesslich der Ansprüche durchgesehen und verstanden habe, die eventuell durch einen Zusatzantrag wie oben erwähnt abgeändert wurde.

Ich erkenne meine Pflicht zur Offenbarung irgendwelcher Informationen, die für die Prüfung der vorliegenden Anmeldung in Einklang mit Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) von Wichtigkeit sind, an.

Ich beanspruche hiermit ausländische Prioritätsvorteile gemäss Abschnitt 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 119 aller unten angegebenen Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde, und habe auch alle Auslandsanmeldungen für ein Patent oder eine Erfindersurkunde nachstehend gekennzeichnet, die ein Anmeldedatum haben, das vor dem Anmeldedatum der Anmeldung liegt, für die Priorität beansprucht wird.

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name,

I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled

Device and method especially for the mobile data collection

the specification of which

(check one)

☐ is attached hereto.

☒ was filed on 20.03.2000 as

PCT international application

PCT Application No. PCT/DE00/00863

and was amended on \_\_\_\_\_ (if applicable)

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims as amended by any amendment referred to above.

I acknowledge the duty to disclose information which is material to the examination of this application in accordance with Title 37, Code of Federal Regulations, §1.56(a).

I hereby claim foreign priority benefits under Title 35, United States Code, §119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:



## German Language Declaration

Prior foreign applications  
Priorität beansprucht

Priority Claimed

19915097.4  
(Number)  
(Nummer)

DE  
(Country)  
(Land)

01.04.1999  
(Day Month Year Filed)  
(Tag Monat Jahr eingereicht)

☒ ☐  
Yes No  
Ja Nein

(Number)  
(Nummer)

(Country)  
(Land)

(Day Month Year Filed)  
(Tag Monat Jahr eingereicht)

☐ ☐  
Yes No  
Ja Nein

(Number)  
(Nummer)

(Country)  
(Land)

(Day Month Year Filed)  
(Tag Monat Jahr eingereicht)

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Ich beanspruche hiermit gemäss Absatz 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 120, den Vorzug aller unten aufgeführten Anmeldungen und falls der Gegenstand aus jedem Anspruch dieser Anmeldung nicht in einer früheren amerikanischen Patentanmeldung laut dem ersten Paragraphen des Absatzes 35 der Zivilprozessordnung der Vereinigten Staaten, Paragraph 122 offenbart ist, erkenne ich gemäss Absatz 37, Bundesgesetzbuch, Paragraph 1.56(a) meine Pflicht zur Offenbarung von Informationen an, die zwischen dem Anmeldedatum der früheren Anmeldung und dem nationalen oder PCT internationalen Anmeldedatum dieser Anmeldung bekannt geworden sind.

I hereby claim the benefit under Title 35, United States Code, §120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, §122, I acknowledge the duty to disclose material information as defined in Title 37, Code of Federal Regulations, §1.56(a) which occurred between the filing date of the prior application and the national or PCT international filing date of this application.

PCT/DE00/00863  
(Application Serial No )  
(Anmeldeseriennummer)

20.03.2000  
(Filing Date D, M, Y)  
(Anmeldedatum T, M, J)

(Status)  
(patentiert, anhangig,  
aufgegeben)

pending  
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(patented, pending,  
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Ich erkläre hiermit, dass alle von mir in der vorliegenden Erklärung gemachten Angaben nach meinem besten Wissen und Gewissen der vollen Wahrheit entsprechen, und dass ich diese eidesstattliche Erklärung in Kenntnis dessen abgebe, dass wissentlich und vorsätzlich falsche Angaben gemäss Paragraph 1001, Absatz 18 der Zivilprozessordnung der Vereinigten Staaten von Amerika mit Geldstrafe belegt und/oder Gefängnis bestraft werden koennen, und dass derartig wissentlich und vorsätzlich falsche Angaben die Gültigkeit der vorliegenden Patentanmeldung oder eines darauf erteilten Patentess gefährden können.

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0593768 2401

# German Language Declaration

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POWER OF ATTORNEY: As a named inventor, I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (list name and registration number)

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And I hereby appoint

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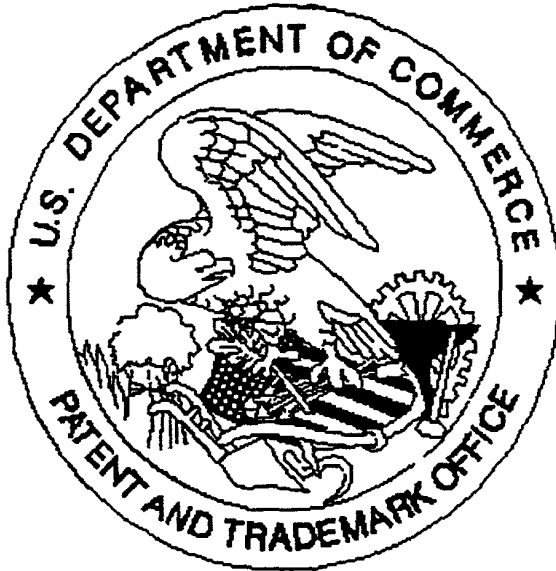
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Unterschrift des Erfinders	Datum	Inventor's signature	Date
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Voller Name des zweiten Miterfinders (falls zutreffend):		Full name of second joint inventor, if any	
<b>THOMAS LANG</b>		<b>THOMAS LANG</b>	
Unterschrift des Erfinders	Datum	Second inventor's signature	Date
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<b>Deutschland</b>		<b>GERMANY</b>	

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